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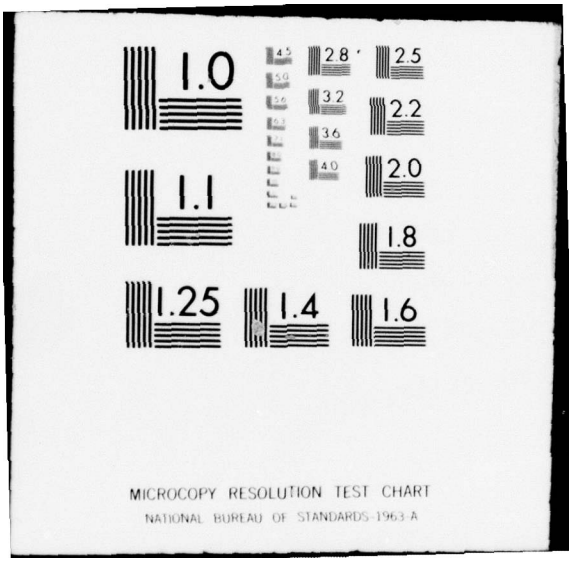
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LEVEL II

Project Manager's Training Device Data Guide

Volume II: Appendices

September 30, 1978

PM TRADE
Naval Training Equipment Center
Orlando, Florida 32813

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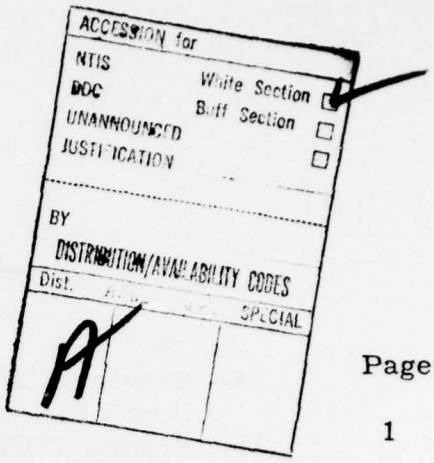

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INTRODUCTION

Volume II of the data guide provides the user with the materials necessary to support the process detailed in Volume I. Volume II contains two appendixes:

- Appendix A; DIDs and
- Appendix B; Suggested Contract Clauses.

Appendix A contains CDRLs for each developmental phase and a sample copy of each DID specified in Sections II and III of Volume I. DIDs have been modified to fulfill special data requirements that training devices demand. It must be emphasized that the specified DIDs represent engineering documentation or analyses that are generally required of prime developers and are certainly within the scope of good engineering practice for any well-run weapon system program. It should also be emphasized that not all the data generated by application of weapon system data DIDs are delivered to the government or to the training device contractor. Only those data identified as necessary through exercise of the data limiting process (Volume I, Section III) and requested of the prime system contractor are delivered.

During the process of assembling the prime system procurement package, the DIDs recommended in this guide should be checked against other DIDs being included in the prime contract to assure that there is no duplication. Only two DIDs included in Appendix A are new DIDs and not existing DIDs modified to accommodate the circumstances imposed by concurrent development and its training devices. The two new DIDs are:

- Report, ITDT Front-End Analysis (DID No. UDI-M-A005)
- Plan, Proprietary Data (DID No. UDI-A-A004)

PM TRADE is in the process of getting these two DIDs approved. Before using these DIDs, current status should be checked with:

PM TRADE Configuration and Data Management Office

DRC PM-TND-CM

Autovon 791-4505

Commercial (305) 646-4505

Appendix B contains contract clauses which are necessary to supplement the DIDs specified in Sections II and III of Volume I. The contract clauses provide a means of establishing the management tools that the project manager (PM) may require to obtain the data in a timely, cost-effective manner. Table 1 contains a list of suggested clauses and a brief description of each. Appendix B contains the clauses with their descriptions.

APPENDIX A

DIDs

PRIME SYSTEM APPLICABLE

DIDs

CONCEPT DEFINITION PHASE

CONTRACT DATA REQUIREMENTS LISTS

CONTRACT DATA REQUIREMENTS LIST

ATCH NR _____ TO EXHIBIT _____ CATEGORY _____ SYSTEM/ITEM _____

TO CONTRACT/PR _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA / 3. SUBTITLE	6. TECHNICAL OFFICE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. 00250 REQ / 8. Rep CODE (A) / 9. INPUT CODE (X)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID	15. TOTAL
1. A001	2. Data Accession List/Internal Data 3.	6.	10. Monthly	12. 30 DAC	14.
4. DI-A-3027/M-128	5.	7. 8. 9.	11.	13. See Block 16	15. TOTAL
16. REMARKS See Addendum Blk 13: Required to be in the program office the last Friday of each month for entire program					
1. A002	2. Report Task Analysis/Task Description 3.	6.	10. 1 time	12. At completion of contract	14.
4. DI-H-2109	5.	7. 8. 9.	11.	13.	15. TOTAL
16. REMARKS					
1. A003	2. Personnel and training requirements 3.	6.	10. 1 time	12. At completion of contract	14.
4. DI-H-1300	5.	7. 8. 9.	11.	13.	15. TOTAL
16. REMARKS					
1. A004	2. Mission Analysis Report 3.	6.	10. 1 time	12. At completion of contract	14.
4. UDI-H-21386	5.	7. 8. 9.	11.	13.	15. TOTAL
16. REMARKS					

PREPARED BY	DATE	APPROVED BY	DATE

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VALIDATION PHASE

CONTRACT DATA REQUIREMENTS LISTS

ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	6. TECHNICAL OFFICE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. DD 250 REQ / 8. APP CODE (A) / 9. INPUT DATA (I)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID	
1. B001	2. Data Accession List/Internal Data 3.	6.	10. Monthly	12. 30 DAC	14.
4. DI-A-3027/M-128	5.	7. 8. 9.	11.	13. See Block 16	15. TOTAL
16. REMARKS See Addendum Blk 13: Required to be in the program office the last Friday of each month for entire program.					
1. B002	2. Master Engineering Document List 3.	6.	10. Monthly	12. 30 DAC	14.
4. DI-E-30142	5.	7. 8. 9.	11.	13. See Block 16	15. TOTAL
16. REMARKS Blk 13: Required to be in the program office the last Friday of each month for entire program.					
1. B003	2. Plan, proprietary data 3.	6.	10. See Block 16	12. 30 DAC	14.
4. UDI-A-A004	5.	7. 8. 9.	11.	13.	15. TOTAL
16. REMARKS Single submission with additional submittals and work-around plans as required.					
1. B004	2. Personnel and training requirements 3.	6.	10. See Blk 16	12. PDR	14.
4. DI-H-1300	5.	7. 8. 9.	11.	13.	15. TOTAL
16. REMARKS Blk 10: Revise as required by engineering changes.					

PREPARED BY	DATE	APPROVED BY	DATE

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ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	6. TECHNICAL OFFICE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. 00250 REQ / 8. Rep CODE (A) / 9. Input TO ILS (X)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID	15. TOTAL
1. B005	2. Mission Analysis Report 3.	6.	10. See Blk 16	12. 60 DAC	14.
4. UDI-H-21386	5.	7. / 8. / 9.	11.	13.	
16. REMARKS Blk 10: Revise as required by engineering changes.					15. TOTAL
1. B006	2. Report, ITDT Front-End Analysis (Validation Phase) 3.	6.	10. 1 time	12. 15 days before CDR	14.
4. UDI-M-A005	5.	7. / 8. / 9.	11.	13.	
16. REMARKS See appropriate Addendum. In-process review shall be conducted at PDR.					15. TOTAL
1. B007	2. Computer program development specification. 3.	6.	10. See Block 16	12. 15 days before CDR	14.
4. DI-E-30139	5.	7. / 8. / 9.	11.	13.	
16. REMARKS Single submittal, resubmit for revisions only.					15. TOTAL
1. B008	2. Interface specifications 3.	6.	10. See Block 16	12. CDR	14.
4. DI-E-30141	5.	7. / 8. / 9.	11.	13.	
16. REMARKS Blk 10: Single submittal, resubmit for revisions only. See Addendum					15. TOTAL

PREPARED BY	DATE	APPROVED BY	DATE

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ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE		6. TECHNICAL OFFICE			10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)	
4. AUTHORITY (Data Item Number)		5. CONTRACT REFERENCE	7. DD250 REQ	8. Rep Code (A)	9. Input Data (X)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID		15. TOTAL
1. B009	2. Functional Flow Diagrams 3.		6.			10. 2 times	12. CDR	14.	
4. DI-S-3604/S-126-1		5.	7.	8.	9.	11.	13. At delivery final		
16. REMARKS									
1. B010	2. Drawings, Engineering, and Associated Lists (Level 1) 3.		6.			10. See Blk 16	12. See Blk 16	14.	
4. DI-E-7031		5.	7.	8.	9.	11.	13. See Blk 16		
16. REMARKS See appropriate DI-E-7031 addendum									15. TOTAL
1. B011	2. Technical Publications for Development 3.		6.			10. 1 time	12. At delivery	14.	
4. DI-M-3413/H-114-1		5.	7.	8.	9.	11.	13.		
16. REMARKS									15. TOTAL
1.	2. 3.		6.			10.	12.	14.	
4.		5.	7.	8.	9.	11.	13.		
16. REMARKS									15. TOTAL

PREPARED BY	DATE	APPROVED BY	DATE

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FULL-SCALE ENGINEERING DEVELOPMENT (FSED) PHASE

CONTRACT DATA REQUIREMENTS LISTS

ATCH NR _____ TO EXHIBIT _____ | CONTRACT DATA REQUIREMENTS LIST | SYSTEM/ITEM _____

TO CONTRACT/PR _____ | CATEGORY _____ | CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE		6. TECHNICAL OFFICE			10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)	
4. AUTHORITY (Data Item Number)		5. CONTRACT REFERENCE	7. DD250 REQ	8. APP CODE (A)	9. INPUT TO ILS (I)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID		
1. C001	2. Data Accession List/Internal Data 3.		6.			10. Monthly	12. 30 DAC	14.	
4. DI-A-3027/M-128		5.	7.	8.	9.	11.	13. See Block 16		15. TOTAL
16. REMARKS See Addendum Blk 13: Required to be in the program office the last Friday of each month for entire program.									
1. C002	2. Master Engineering Documents List 3.		6.			10. Monthly	12. 30 DAC	14.	
4. DI-E-30142		5.	7.	8.	9.	11.	13. See Block 16		15. TOTAL
16. REMARKS Blk 13: Required to be in the program office the last Friday of each month for entire program.									
1. C003	2. Plan, proprietary data 3.		6.			10. See Blk 16	12. 30 DAC	14.	
4. UDI-A-A004		5.	7.	8.	9.	11.	13.		15. TOTAL
16. REMARKS Single submission with additional submittals and work-around plans as required.									
1. C004	2. Engineering Change Proposals (ECPs) and 3. Request for Deviation and Waiver		6.			10. As required	12. As required	14.	
4. DI-E-1102A		5.	7.	8.	9.	11.	13.		15. TOTAL
16. REMARKS									

PREPARED BY	DATE	APPROVED BY	DATE

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ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE		6. TECHNICAL OFFICE 7. DD 250 REQ	8. REP CODE (A)	9. INPUT POINT (B)	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)	
4. AUTHORITY (Data Item Number)		5. CONTRACT REFERENCE				11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID		
1. C005	2. Personnel and training requirements 3.		6.			10. 2 times	12. PDR	14.	
4. DI-H-1300		5.	7.	8.	9.	11.	13. 30 DAC Final		15. TOTAL
16. REMARKS									
1. C006	2. Computer program development specification 3.		6.			10. See Blk 16	12. 15 days before CDR	14.	
4. DI-E-30139		5.	7.	8.	9.	11.	13.		
16. REMARKS Single submittal, resubmit for revisions only.									15. TOTAL
1. C007	2. Interface specification 3.		6.			10. See Blk. 16	12. CDR	14.	
4. DI-E-30141		5.	7.	8.	9.	11.	13.		
16. REMARKS See Addendum. Blk 10: Single submittal, resubmit for revisions only.									15. TOTAL
1. C008	2. Functional Flow Diagrams 3.		6.			10. 2 times	12. CDR	14.	
4. DI-S-36041/S-126-1		5.	7.	8.	9.	11.	13. At delivery		
16. REMARKS									15. TOTAL

PREPARED BY	DATE	APPROVED BY	DATE

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ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	6. TECHNICAL OFFICE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. DD 250 REQ / 8. Rep Code (A) / 9. Input Data (B)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID	15. TOTAL
1. C009	2. Simulator Design, Data Requirements 3.	6.	10. 2 times	12. CDR	14.
4. DI-T-30717	5.	7. / 8. / 9.	11.	13. At delivery	
16. REMARKS					15. TOTAL
1. C010	2. Report, ITDT Front-End Analysis 3. (FSED Phase)	6.	10. 1 time	12. 15 days before CDR	14.
4. UDI-M-A005	5.	7. / 8. / 9.	11.	13.	
16. REMARKS See appropriate Addendum In-process review shall be conducted at PDR.					15. TOTAL
1. C011	2. Computer program product specification 3.	6.	10. 2 times	12. At delivery	14.
4. DI-E-30140	5.	7. / 8. / 9.	11.	13. 60 days after accept-ance	
16. REMARKS See Addendum					15. TOTAL
1. C012	2. Drawings, Engineering and Associated Lists (Level 2) 3.	6.	10. See Blk. 16	12. See Blk 16	14.
4. DI-E-7031	5.	7. / 8. / 9.	11.	13. See Blk 16	
16. REMARKS See appropriate DI-E-7031 Addendum.					15. TOTAL

PREPARED BY _____ DATE _____ APPROVED BY _____ DATE _____

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BASIC DATA CLASS

DIDs

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S)	
	AGENCY	NUMBER
1. TITLE Data Accession List/Internal Data	USAF	DI-A-3027/ M-128 (Mod)

3. DESCRIPTION/PURPOSE

The purpose of the data item description is to provide an accession list which is an index of data that may be available for request. It is a medium for identifying contractor internal data which have been generated by the contractor in compliance with the work effort described in the Statement of Work.

4. APPROVAL DATE
26 Feb. 1971

5. OFFICE OF PRIMARY RESPONSIBILITY
AFSC

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP

This Data Item Description is designed for use on R&D type contracts to facilitate the identification of internally generated data that is usually not determinable at the outset of a contract. The objective is to use this DID as a supplement to, but not as a replacement for standard data requirement that are contractually applied. This DID may be used on advanced development and prototype/validation procurements, especially when competitive contracts are issued. Here again, this DID is not a substitute for standard reporting requirements.

9. REFERENCES (Mandatory as cited in block 10)

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

1. The contractor shall prepare a list of internally generated data used by the contractor to develop, test and manage the program. The format and content of these data shall be as prepared by the contractor to document his compliance with the Statement of Work task requirements.

2. The Data Accession List as a minimum, shall include the identification number, title, and in-house release date.

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SAMPLE

ADDENDUM TO DI-A-3027
DATA ACCESSION LIST/INTERNAL DATA

1.0 The Contractor shall prepare and furnish, other than data required to be submitted by other provisions of this contract, a detailed list of all the data generated by the Contractor or received from the Contractor's subcontractors in the performance of this contract. This list shall be in a format, arrangement and content acceptable to the Government. This list, as a minimum, shall include the identification number, title, in-house release data and any contract scope of work reference. In addition, it shall contain a very brief description of the content if it is not evident from the balance of the identification.

1.1 This data item is compiled with the agreement that the Contractor will afford the Government complete access to internal data, both periodic and one time, that is generated during the development, test and management of the _____ Program.

The Contractor shall group listed items of internal data into logically related categories (e.g., do not mix engineering items with financial management items). All data generated in the process of developing and verifying math models and computer software shall be listed on the accession list. The list below provides examples of data categories. This list is supplementary to drawings listed in the master engineering documents list and should not include drawings or specifications listed there.

Each data category should contain the types of data listed and be sorted by subcategory identifier. The categories and subcategories listed shall be provided as a minimum. Additional categories and subcategories can be added as required and defined in the submittal.

1.0 Drawings
1.1 Block diagrams
1.2 Flow diagrams
1.3 Access drawings
1.4 Field of view drawings
1.5 Arrangement drawings
1.6 One function drawings
1.7 Timing diagram
1.8 Functional schematics
2.0 Engineering reports
2.1 Performance requirements
2.2 Best results
2.3 Evaluation reports
2.4 Reference materials
2.5 Calculations
2.6 Tables and charts of data or performance
2.7 Logistic support analysis
2.8 Training requirement analysis
2.9 Design Reports
2.10 Design Data
2.11 Mission Analysis Reports
2.12 Concept reports

3.0 System Engineering
3.1 Hardware Development Specifications
3.2 Software Development Specifications
3.3 Design Verification Tests
3.4 Test Procedures
3.5 Mathematical Models
3.6 Data Base Development Requirements
3.7 Design Data Source Lists
3.8 Computer Storage Requirements Analysis
3.9 System Timing Analysis
4.0 Configuration management
5.0 Producibility
6.0 Standardization
7.0 Integrated Logistic Support
7.1 Personnel and Skill Reports
7.2 Training Device Analysis
7.3 Facility Requirements
7.4 Support Equipment Requirements
7.5 Repairs Level Analysis
8.0 Ground Support Equipment
9.0 System Safety
9.1 Interlock Analysis
9.2 Safety Report
10.0 Human Factors
10.1 Task Analysis Studies
10.2 Human Factors Test Reports
10.3 Display Studies

10.4 Control Studies

10.5 Configuration Studies

10.6 Manning Analysis

10.7 Performance Aids

10.8 Critical Task Studies

11.0 Maintainability

11.1 Built-in-test Analysis

11.2 Maintenance Engineering Analysis

11.3 Maintenance and Daily Readiness Procedures

12.0 Reliability

13.0 Survivability/Vulnerability

14.0 Nuclear and Radioactive data

15.0 Photographic, motion picture, and recording records

15.1 Sensor/Display photographic material

15.2 Equipment Pictures

15.3 Audio recordings

16.0 Specifications

1.2 Upon order of the Government, the Contractor shall provide a copy of any Contractor generated data or Contractor's subcontractor data received by the Contractor of the above type. However, this access is not limited to that listed above. The format and content of these internal data shall be as prepared by the Contractor to document his compliance with this contract. It is understood that the Government will not approve or disapprove any of the data submitted pursuant to this data item.

1.3 The Contractor shall furnish the required copies of the data as directed by the Government. Response time for submittal of data requested by the Government shall be: Routine - five (5) days (mailed by Contractor) and Emergency - four (4) hours (most expeditious method).

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S).	
	AGENCY	NUMBER
1. TITLE MASTER ENGINEERING DOCUMENT LISTS		DI-E-30142 (Mod)
3. DESCRIPTION/PURPOSE Provide information necessary for preparation, maintenance and delivery of Master Engineering Document Lists.	4. APPROVAL DATE 19 May 1976	
	5. OFFICE OF PRIMARY RESPONSIBILITY AFSC	
	6. DDC REQUIRED	
	8. APPROVAL LIMITATION	
7. APPLICATION/INTERRELATIONSHIP 1. The Master Engineering Document Lists will be used to provide a master list of part numbers to Engineering Documents (drawings, lists, specifications, etc.) number relationship and detail/subassembly to next higher assembly or end item document relationship. 2. It will be used to record the total number of individual engineering documents required to support contract end items and as a cross reference to parts lists prepared for individual items and associated drawings, specs, etc. for the item. 3. This Master Engineering document list will be provided in lieu of Data Lists and Index Lists; para 601.2 & 601.3 of MIL-STD-100B.	9. REFERENCES (Mandatory as cited in block 10) MIL-D-1000A & MIL-STD-100B	
	MCSL NUMBER(S)	

10. PREPARATION INSTRUCTIONS

1.0 The contractor shall prepare and furnish Master Engineering Documents lists including all items provided by the contractor's subcontractors used on the performance of this contract. These lists shall be in a format, arrangement, and content acceptable to the government and have the information specified in the Data Item Description.

1.1 Upon order of the government, the contractor shall provide a reproducible copy of any contractor-generated drawing or data or contractor's subcontractor's drawing or data on the list.

1.2 Subcontractor, vendor or supplier of engineering documents that are obtainable by the contractor in support of deliverable items.

1.3 The contractor shall furnish the required copies of the data as directed by the government. Response time for submission of data or drawings requested by the government shall be as defined in the Data Accession Clause.

2.0 Preparation instructions:

2.1 Size, format, and Entry of Information. The list shall be prepared in the size and format shown in Figure 1. The requirements contained in 2.3 through 2.3.17 shall be followed for the entry of information in the various blocks and columns of the list.

2.2 Sequence. The engineering documents (drawings, lists, specification, standards, etc.) required for a complete system or end item, shall be sequenced by main-group or main-assembly as follows:

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System or End Item Drawing

. Documentation applicable to only the system or end items

. Assembly drawing number X

.. Documentation applicable only to assembly drawing number X

... Subassembly drawing Y referenced on assembly drawing number X

.... Documentation (specifications, standards, etc) applicable only to subassembly drawing Y

.... Detail documentation for parts referenced on drawing Y

. Assembly drawing number Z

(Same breakdown as drawing X above)

The indenturing of these documents and the use of indenture codes shall be in accordance with 2.3.13.

2.3. Entry of Information

2.3.1. Block 1, Contract Number. On each sheet, enter the contract number pertinent to the procurement of the complete system or end item which is identified by the top document number in block 6.

2.3.2. Block 2, Revision Letter. When the list is initially prepared enter a hyphen (-) on each sheet of the list. Each time any sheet of the list is revised, enter the appropriate revision letter (alphabetical sequence) on the revised sheet.

2.3.3. Block 3, Revision Date. When the list is initially prepared, enter a hyphen (-) on each sheet of the list. Each time any sheet of the list is revised, enter the appropriate revision date on the revised sheet.

2.3.4. Block 4, Contractor. On each sheet, enter the name and address of the contractor (design/preparing activity).

2.3.5. Block 5, Federal Supply Code for Manufacturer's (FSCM). On each sheet, enter the FSCM assigned to the contractor/vendor, as applicable, whose name is entered in block 4.

2.3.6. Block 6, End Item-System Designator. On each sheet, enter the end item and/or system designator to which the Master Engineering Document List applies. When a designator has not been assigned, the top assembly drawing number of the item shall be entered in this column.

2.3.7. Block 7, Sheet Number. On each sheet, enter the appropriate sheet number (i.e., 1, 2, 3, etc). When only one sheet is required for a list, "Sheet 1 of 1" will be entered. When two or more sheets are required for a list (e.g., 10 sheets), the total number of sheets shall be included on the first sheet only and "Sheet 1 of 10" shall be entered in this block. When a sheet is revised and addition sheets are required, the additive sheets shall be numbered in alpha sequence (i.e., Sheet "1", "1A," "1B," etc).

2.3.8. Column 8, Type of Document Code. Enter the type of document code which identifies the document whose number is entered in column 9. The type of document codes are as follows:

Code	Type of Document
AR	Arrangement Drawing
AS	Assembly Drawing
CA	Cable Assembly Drawing
DD	Detail Drawing
ED	Envelope Drawing
EL	Elevation Drawing
ID	Interconnection Diagram
IL	Index List
LD	Logic Diagram
MP	Modification Drawing
MS	Mechanical Scenatic Diagram
OL	One-line Diagram
OP	Optical elements/systems drawing
PD	Piping Diagram
PL	Parts List
PV	Plan Drawing
QA	Quality Assurance Data
SD	Schematic Diagram
TS	Test Procedure/specification
WD	Wiring Diagram
WL	Wire List

MIL-STD-100B shall be used as a reference for drawing categorization. If new classes are required for documents listed they shall be assigned a Z followed by a single alpha-numeric identifier. A definition of all new classes shall be provided with the list.

2.3.9. Column 9, Document Number. Enter the number of each document (drawing, list, specification, etc.) in accordance with 2.3.9.1 or 2.3.9.2, as applicable.

2.3.9.1. Prime Contractor and/or Vendor Numbers. The document numbers of all procured and used vendor items shall be entered. Only those document numbers which identify the vendor item used (assembly number for an assembly, part number for a detail part, etc.) are required.

2.3.9.2. Additions and deletions of document numbers shall be reflected in this column as follows:

a. Addition. Entry of new document number to this list shall be identified by a single asterisk (*) to the immediate right of affected document number. This asterisk shall appear only on the revised list implementing a new document number.

b. Deletion. A document number being deleted shall reflect a double asterisk (**) to the immediate right of affected document number. Subsequent revision shall not reflect a deleted document number which was shown on the previous list.

c. In lieu of b and c above, a separate addition/deletion list(s) may be provided as a supplement to the basic list.

2.3.10. Column 10, Sheet Number. Each sheet of a multisheet drawing shall be individually listed if each may be revised and issued independently. When the first sheet of drawing, reflected on column 10, contains the revision status of all sheets, only one entry will be required, and this will be the total number of sheets for that drawing.

2.3.11. Column 11, Federal Supply Code for Manufacturers (FSCM). Enter the appropriate FSCM assigned to the contractor, subcontractor, vendor, supplier, etc., whose document number appears in column 9.

2.3.12. Column 12, Revision Letter(s). Enter the latest revision letter(s) applicable to the document whose number is entered in column 9.

2.3.13. Column 13, Indenture Number. Enter the indenture number applicable to the document whose number is entered in column 10. The number entered in this column shall indicate the relationship of engineering documents to the subassembly, assembly, main group, complete system, or end item, e.g.;

1. Drawing for a complete system or end item.

2. Drawing for a main group or assembly.

2. Assembly drawing.

3. Drawing for attaching parts used on the assembly.

3. Parts list referenced on assembly drawing.

3. Detail drawings referenced on the assembly drawing.

3. Subassembly drawing referenced on the assembly drawing.

4. Detail drawings referenced on subassembly drawing.

4. Drawings for attaching parts used on the subassembly drawing.

2. Assembly drawing.

3. Detail drawings referenced on assembly drawing.

3. Specification referenced on assembly drawing.

3. Subassembly drawings referenced on the assembly drawing.

2.3.14. Column 14, Source Codes. When items are source coded, the source code assigned to the hard item, delineated on the document (ref column 10), shall be entered in this column. These codes are as follow:

A. Nonprocurable Assembly which can be built up from details at any maintenance level.

A1. Same as A, but depot only.
M. Field manufacture, procurement not justified.
M1. Same as M, but depot manufacture.
P6. Parts which may be procured by open competition.
P7. Parts procurable only from selected sources.
P8. Parts which must be procured sole source.
U. Drawings, instructions sheets, parts not of maintenance significance, including obsolete parts.

2.3.15. Column 15, Rights Information. Enter the code which identifies the rights status of the information on the document whose number appears in column 10. The rights status codes are as follows:

a. "U" signifies that the Government has an unlimited right to use the document so coded.

b. "L" signifies that the Government has only a limited right to use the document so coded.

MASTER ENGINEERING DOCUMENT NUMBER LIST

1. CONTRACT NO	2. REV LTR	3. REV DATE
4. CONTRACTOR	5. FSCM	6. END ITEM SYSTEM DESIGNATOR

7. SHEET

8. TYPE DOCUMENT CODE	9. DOCUMENT NO	10. SHEET NO	11. FSCM	12. REV. LTR.	13. IND. NO.	14. SOURCE CODE	15. RIGHTS	16. DATA SUBMITTAL STATUS	17. PERT NO.

NOTES: 1. SEQUENCE OF BLOCKS AND COLUMNS SHALL BE MAINTAINED. SIZE OF BLOCKS AND WIDTH OF COLUMNS MAY VARY TO SATISFY EITHER MANUAL OR MACHINE PREPARATION PRACTICES.

2. SIZE REQUIREMENTS:
   A. MANUAL - 8 1/2" x 11"
   B. MACHINE - 11" x 13 3/4"

FIGURE 1

☆ U. S. GOVERNMENT PRINTING OFFICE: 1977-703-020 4541

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
Army	DI-E-1102A (Mod.)

1. TITLE
Engineering Change Proposals (ECPs) and Request for Deviations and Waivers

3. DESCRIPTION/PURPOSE
An Engineering Change Proposal (ECP) describes a proposed alteration in the configuration of a configuration item (CI) after formal establishment of its configuration identification i.e., Functional Configuration Identification (FCI), Allocated Configuration Identification (ACI), or Product Configuration Identification (PCI). It includes both the proposed engineering change and the attendant change to the documentation.

4. APPROVAL DATE
1 May 1972

5. OFFICE OF PRIMARY RESPONSIBILITY
USAMC-RD

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP
1. This data item will be applied only to contracts which require preparation and submission of ECP as a deliverable item in the contract schedule. An example of this type of contract is a contract for production engineering services or value engineering requiring the preparation and submission of ECP or VECP for Government action.
2. Preparation and submission of ECP's of a contingent nature including those prepared in accordance with MIL-STD-481 shall be covered by the contract change clause.
3. This data item is relatible to AMSL 11552 Configuration Management.

9. REFERENCES (*Mandatory as cited in block 10*)
MIL-STD-480

MCSL NUMBER(S)
20847

10. PREPARATION INSTRUCTIONS
ECP shall be prepared in accordance with MIL-STD-480 by contractors who have participated or are participating in the engineering or operational system development of a system or high level CI or are being supplied with copies of the system, development and/or product specification(s).

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PAGE 1 OF 1 PAGES

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
	UDI-A-A004

1. TITLE

Plan, Proprietary Data

3. DESCRIPTION/PURPOSE

The purpose of the data item description is to provide a list of the data items applicable to the contract, that the Contractor considers proprietary including justification for such a classification. In addition, it shall provide a work-around plan for such data so that a separate contract can be awarded for training equipment required to support the weapon system being developed.

4. APPROVAL DATE

5. OFFICE OF PRIMARY RESPONSIBILITY

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP

The list shall include all proprietary data required to be listed by the Data Accession List/Internal Data (DI-A-3027/M-128) and the Master Engineering Document Lists (DI-E-30142)

9. REFERENCES (*Mandatory as cited in block 10*)

ASPR 7-104.9

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

1.0 The Contractor shall prepare and furnish a Proprietary Data List, as per ASPR 7-104.9, including identification of those Contractor-defined items which may hinder development of training materials, training courses and equipment by independent contractors. This list shall include all applicable items supplied to the Contractor by his subcontractors. This list shall be in a format arrangement, and content acceptable to the government. In addition, it shall contain a brief description of the proprietary material and justification for its Limited Rights status.

1.1 The Contractor shall furnish a copy of the list and supporting descriptive material 30 days after date of contract.

2.0 The government may request the Contractor within 180 DAC to prepare a plan for alternative means of disclosing sufficient information for development of training materials in lieu of the release of the proprietary data included in the list.

2.1 The Contractor shall submit the plan within 90 days after the date of request for the plan.

3.0 The government shall be notified after submittal of the first list of any changes which will require the addition of proprietary data to the list. Additions approved by the government shall be subject to the same conditions as the initial submissions.

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PAGE 1 OF 1 PAGES

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
NAVY	DI-H-2109 (Mod)

1. TITLE
REPORT, TASK ANALYSIS/TASK DESCRIPTION

3. DESCRIPTION/PURPOSE
This report describes the results of task analyses performed by the contractor and presents task descriptions. The purpose of the report is to summarize the work that the operator/maintainer performs and to provide a basis for the design of the system, equipment, or facilities.

4. APPROVAL DATE
1973 July 20

5. OFFICE OF PRIMARY RESPONSIBILITY (& Users)
NM (AS EC SH)

6. DDC REQUIRED
NA

8. APPROVAL LIMITATION
NA

7. APPLICATION/INTERRELATIONSHIP

7.1 This data item describes data documenting a portion of the contractor's effort required by MIL-H-46855, para. 3.2.1.3, 3.2.1.3.1, and 3.2.1.3.2.

7.2 Task Analysis/Task Description Reports will be used to evaluate the contractor's analyses of men in the system.

7.3 This data item is related to DI-H-2104, Human Engineering Program Plan; DI-H-2107, Human Engineering Design Document.

9. REFERENCES (Mandatory as cited in block 10)
MIL-H-46855

MCSL NUMBER(S)
10781

10. PREPARATION INSTRUCTIONS

10.1 Unless otherwise indicated herein, the documents cited in this block, of the issue in effect on date of invitation for bids or request for proposals, form a part of the DID to the extent specified herein.

10.2 The Task Analysis/Task Description Report shall be prepared in contractor selected format of flow diagrams, tabular presentations, and narrative. The report shall describe the results of the task analyses required by MIL-H-46855, para 3.2.1.3 and shall consist of the following:

a. Summary of gross tasks identified during analyses performed in response to MIL-H-46855, para. 3.2.1.3.1.

b. Identification of critical task characteristics as required by MIL-H-46855, para. 3.2.1.3.2, if applicable. Supporting evidence shall be supplied if applicable. Example: The method by which an operator's reaction time is estimated should be included.

c. The results of the operator/maintainer workload analysis - If there is more than one crew member involved in the system operation, the interaction workload of the crew members shall also be identified.

d. Discussion of related factors such as system or equipment performance, cost and delivery schedule when these factors are affected by one or more of the critical tasks.

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DI-H-2109

Preparation Instructions (Continued)

e. Discussions of task-related data shall be extracted from the task analyses and compiled in preliminary operator/maintainer procedurally oriented task descriptions for use in developing procedures documents, personnel planning and system testing.

SAMPLE

DATA ITEM DESCRIPTION	2 IDENTIFICATION NO(S)	
	AGENCY	NUMBER
1 TITLE Personnel and Training Requirements	Army	DI-H-1300 (Mod)

3 DESCRIPTION/PURPOSE

Qualitative and quantitative information developed by the contractor is used by responsible equipment management agencies to identify operator and maintenance personnel requirements by numbers, skills, and other qualifications, and to plan for the conduct of necessary training programs in operation and maintenance.

4 APPROVAL DATE
15 December 1969

5 OFFICE OF PRIMARY RESPONSIBILITY
USAMC

6 DDC REQUIRED

8 APPROVAL LIMITATION

7 APPLICATION/INTERRELATIONSHIP

9 REFERENCES (Mandatory as cited in block 10)
AR 71-5 AMCR 750-15
AR 350-12 TM 38-703-4
AR 611-1
AR 611-101
AR 611-112
AR 611-201
AR 705-6
AMCR 350-6

MCSL NUMBER(S)

10 PREPARATION INSTRUCTIONS

A qualitative and quantitative personnel requirements information (QQPRI) report and a new equipment training (NET) requirements report shall be prepared by the contractor in accordance with the detailed preparation instructions and format requirements of the procuring activity specified on DD Form 1423 for equipment which is to be developed.

1. QQPRI Report

a. Personnel requirements for all maintenance levels shall be reported by the contractor and shall include the following:

1) A listing of duty positions required to operate and maintain the equipment.

2) Descriptions of these positions and suggested placement within a current MOS as listed in AR 611-101, AR 611-112, and AR 611-201. Revised or new MOS codes required shall be reported, described, and thoroughly justified.

3) Numerical personnel requirements in both chart and narrative form showing estimates of manpower required to operate and perform maintenance tasks at the organizational, direct support, general support and depot levels. Estimates should consider all predictable factors affecting personnel performance. (Continued on next page)

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1. QQPRI Report (continued)

    4) Special skills, knowledge, abilities, physical or mental qualifications required to perform operator or maintenance tasks. Primary effort should be directed toward identification of new and unique skills.

b. Information in this report shall be derived from task analysis/description required by DI-H-2109 of FEA applied to the contract. Otherwise, this report shall be developed from system engineering or other available data.

2. NET Requirements Report

a. Operator and maintenance training requirements shall be reported by the contractor in narrative format and shall contain details for conduct of the following:

    1) Staff planner courses
    2) Technical training courses for operators, maintainers, key instructor, key depot, and other key personnel as required
    3) New material introduction (NMI)
    4) New equipment training teams (NETT)

b. Details shall include as appropriate:

    1) Course title
    2) Course length
    3) Functional area (maintenance or operations)
    4) Entrance requirements
    5) Course output stated in terms of an existing MOS or appropriate position definition
    6) Subject outline of proposed program of instruction
    7) Class size (number of students per class session and practical exercise session)
    8) Equipment required
    9) Training devices and aids
    10) Training equipment
    11) Facilities/services

SAMPLE

DATA ITEM DESCRIPTION

2 IDENTIFICATION NO(S)	
AGENCY	NUMBER
	UDI-H-21386 (Mod)

1. TITLE
Mission Analysis Report

3. DESCRIPTION/PURPOSE
The Mission Analysis Report documents the analysis of weapon system objectives, which yields definitions of required mission functions in response to likely events and provides a basis for defining system equipment operation and personnel responsibilities.

4. APPROVAL DATE
24 Sept 1974

5. OFFICE OF PRIMARY RESPONSIBILITY

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP
This data item describes mission analysis data used as inputs to the analyses required by paragraph 3.2.1, Analysis of MIL-H-46855.

9. REFERENCES (Mandatory as cited in block 10)
MIL-H-46855

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

10.1 Unless otherwise indicated herein, documents cited in this block of the issue in effect on the date of invitation for bids or the request for proposals or quotations, form a part of the data item description to the extent specified herein.

10.2 The Mission Analysis Report shall document the analysis of system requirements and mission objectives chronologically and under a specified set of relevant environmental conditions. It describes a portion of the contractor's effort required by MIL-H-46855, paragraph 3.2.1. The report shall contain the following sections:

10.2.1 The first section shall list gross system functions essential to mission implementation. Examples of gross functions are:

a. Mission planning
b. Fault/failure detection and analysis
c. Vehicle control characteristics
d. Management of fuel and other power resources
e. Survivability/vulnerability analysis
f. Special sensor descriptions
g. Target acquisition and attack
h. Stores management
i. Communications

(Continued on next page)

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10.2.1 (Continued)

j. Identification
k. Monitoring or environmental factors
l. Self-defense

10.2.2 Section 2 of the report shall describe mission scenario, based upon the results of the above, in sufficient number and variety to encompass all operational objectives established for the weapon system.

10.2.3 Section 3 of the report shall include, for each mission scenario, a detailed narrative description of mission events and the gross functions, beginning with mission planning and extending throughout conduct of combat or other primary mission operations. A narrative account of a hypothetical and/or actual mission shall be given in terms of significant events in a chronological sequence. The events and mission segments mentioned above are typical, but they may vary depending upon the specific objectives and requirements of the system under study. Section 3 of the report shall be prepared in the following two parts:

10.2.3.1 *Mission events and gross functions profile shall be divided* into significant segments as follows:

a. An explicit definition of the commencing event
b. An explicit definition of objectives to be met
c. The functional requirements for the achievement of those objectives
d. A description of the environment conditions and mission context in which objectives are to be met
e. A chronology of events within the segment including time of occurrence and duration of operations between events
f. An explicit definition of the end point event

10.2.3.2 Objectives to be accomplished during each segment shall be defined as follows:

a. Adequate preparation and planning for initiation of mission
b. The functional requirements for the achievement of those objectives
c. Provision of adequate self-defense at all times
d. Achievement of planned level of target destruction

10.2.3.2 (Continued)

e. Acquisition of pre-planned reconnaissance data
f. Acquisition of unanticipated sources of intelligence data

10.2.4 Section 4 of the report shall present a schedule of mission segments. Beginning with the events commencing the first mission segment, list each event and function in chronological sequence. At significant choice points, alternative sequences shall be shown. The conditions for selecting an alternative sequence shall be identified and shall include the type and source of information presented to the operator or to the equipment item. Conditions requiring the selection of alternative event/function sequences include:

a. Mission contingencies
b. Equipment failure or degradation
c. Battle damage
d. Significant weather changes

The mission event/function schedule shall specify both time and geographical location for each mission event. The start and end times and the corresponding geographical locations of each mission function shall also be specified.

WEAPON SYSTEM DATA CLASS

DIDs

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S).	
	AGENCY	NUMBER
1. TITLE Computer Program Development Specification	USAF	DI-E-30139
3. DESCRIPTION/PURPOSE The functional configuration identification and allocated configuration identification documentation (specifications) establish the performance, design, development, and test requirements for all Computer Program Configuration Items (CPCI) to be developed under the terms of the contract. It is used by the contractor as the "design to" document, and by the Air Force to assure that the design encompasses all the development requirements.	4. APPROVAL DATE 14 July 1976	
	5. OFFICE OF PRIMARY RESPONSIBILITY AFSC	
	6. DDC REQUIRED	
	8. APPROVAL LIMITATION	
7. APPLICATION/INTERRELATIONSHIP The CPCI development specification(s) after acceptance by the procuring activity establishes the performance requirements which the CPCI must satisfy upon completion of the development phase. A CPCI development specification is required for each CPCI allocated from the system specification which established the functional baseline or from a higher level configuration item or for a non-system CI. The development specification will normally be prepared as Part I of a two part specification unless otherwise specified in the contract. Formerly UDI-E-3119B (ASD)	9. REFERENCES (*Mandatory as cited in block 10*) AFSCM/AFLCM 375-7 MIL-STD-483 (USAF) MIL-STD-490 AFR 800-14, VOL II dated 26 Sep 75	
	MCSL NUMBER(S)	

10. PREPARATION INSTRUCTIONS

1. General Requirements. The Computer Program Development Specification (CPDS) shall describe in detail all the operational and functional requirements necessary to design, test, and maintain the required computer program. In addition, it shall provide the logical, detailed descriptions of the performance requirements of a digital computer program. The requirements stated in the specification shall be compatible with all components of the digital system interfaced systems. However, the specification shall not unnecessarily duplicate descriptive material presented in other documents.

2. Detailed Requirements. For convenience in describing the minimum essential content, the following paragraphs show a normal format for presentation of the material. In the following description, paragraph headings and numbers indicate the general nature of the topic, and are minimum mandatory requirements.

a. Section 1 - Scope. This section shall consist of the following paragraphs:

(1) Paragraph 1.1 - Identification. This paragraph shall contain the approved identification, title, and authorized abbreviation for the computer program

(2) Paragraph 1.2 - Functional Summary. This paragraph shall contain a brief description of the overall computer program by major functions (tasks) and the interdependency among these functions.

b. Section 2 - Applicable Documents. This section shall list all documents which define or constrain the performance requirements of the computer program. The following categories shall be included:

(1) Paragraph 2.1 - Program Definition Documents. This paragraph shall list all documents, letters, etc., which state or define the performance requirements of the computer program.

(2) Paragraph 2.2 - Inter-Subsystem Specifications. This paragraph shall list all relevant system and subsystem specifications.

(3) Paragraph 2.3 - Military Specifications and Standards. This paragraph shall list all relevant military specifications and military standards or documents.

(4) Paragraph 2.4 - Miscellaneous Documents. This paragraph shall contain a list of all documents which apply to the performance specification but are ineligible for placement in the above paragraphs. For example, contracts standards and procedures, interface control drawings, etc.

c. Section 3 - Requirements. This section shall define and specify all functional, operational, and performance requirements; plus all design constraints and standards necessary to ensure proper development and maintenance of the computer program.

(1) Paragraph 3.1 - Introduction. This paragraph shall contain a general discussion of the digital system within which the program will operate. It shall show the relationships of each component, such as radars, displays, and converters, with the computer program. In particular, the role assigned to the computer program should be stressed to delineate the functions it must accomplish. The paragraph shall include the following subparagraphs:

(a) Paragraph 3.1.1 - General Description. This program shall provide a general discussion of the computer system and make reference to other component performance specifications that will further clarify the performance requirements of the subject system.

(b) Paragraph 3.1.2 - Peripheral Equipment Identification. This paragraph shall provide an identification of the peripheral equipment with which the specified program will interface.

(c) Paragraph 3.1.3 - Interface Identification. This paragraph shall provide an identification of any computer programs or computer systems with which the specified program will interface.

(2) Paragraph 3.2 - Functional Description. This paragraph shall provide a detailed description of the functions of the computer program and shall describe the functional relationships of the computer program with interfacing equipments and with other computer programs. This paragraph shall include the following:

(a) Paragraph 3.2.1 - Equipment Descriptions. This program shall contain a separate subparagraph for each equipment which is a part of the computer system. Each subparagraph shall contain a description of the requirements imposed on the computer program by each interfacing equipment (e.g., data converters, displays, on-line console, keysets), the purpose of the equipment, equipment options and controls, and how it is used in the computer system. Timing, resolution and accuracy of the equipments shall be described.

(b) Paragraph 3.2.2 - Computer Input/Output Utilization. This paragraph shall summarize the input/output requirements placed on the computer program by attached equipment.

(c) Paragraph 3.2.3 - Computer Interface Block Diagram. This paragraph shall contain a block diagram of the equipment/computer relationships to facilitate flow between the computer and system equipment. The diagram shall show the data flow between the computer and system equipment. The diagram shall also indicate input/output channel utilization and all interfacing or other devices.

(d) Paragraph 3.2.4 - Program Interfaces. This paragraph shall describe all interfaces between the subject computer program and the computer programs of other systems with which it must interface. The descriptions shall state the purpose of each interface, identify the data to be exchanged via the interface, and contain an estimate of data quantity and transfer rate requirements per second. The specific inter-

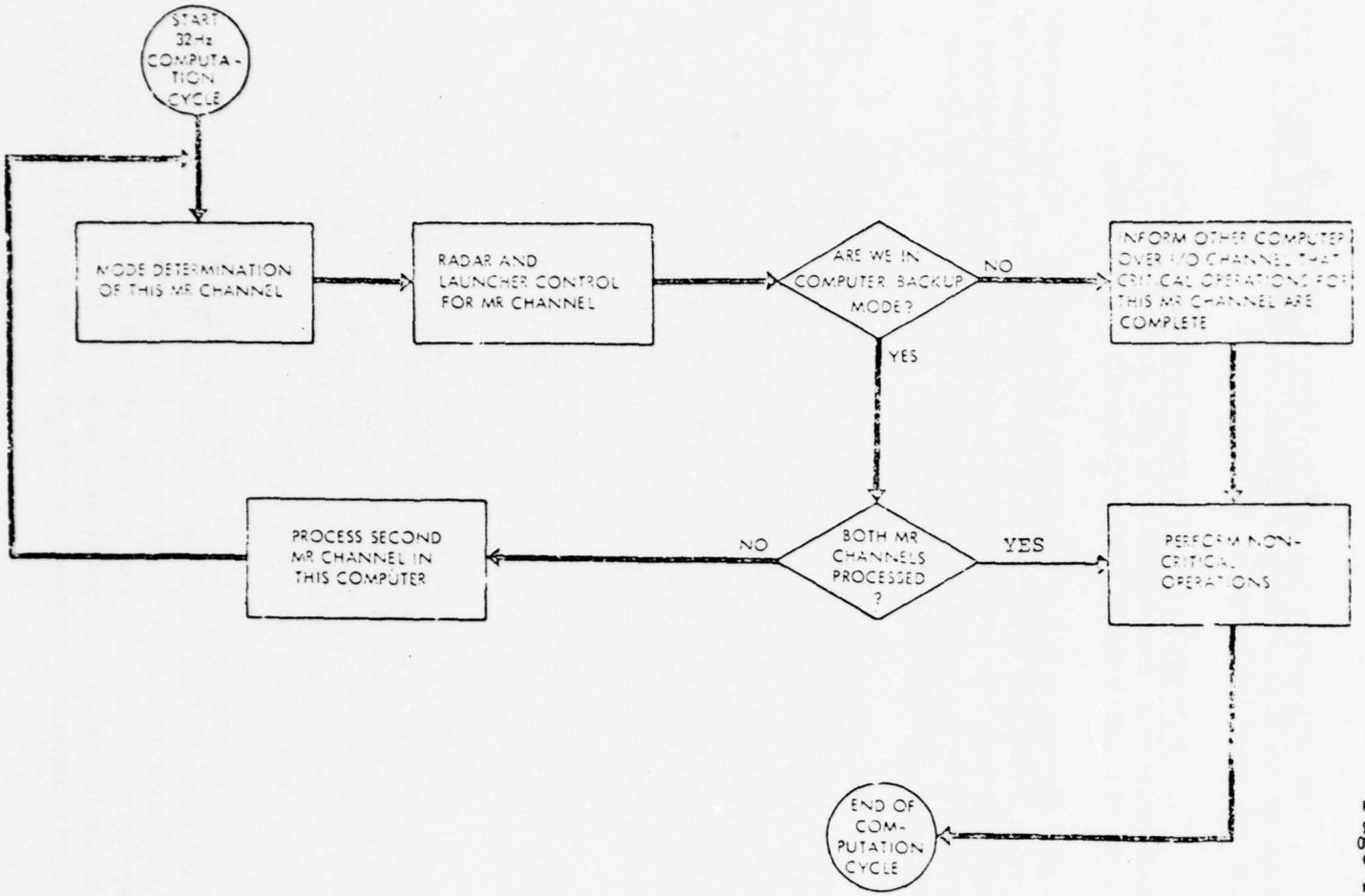

Figure 1. Sample Simplified Flowchart of a Single Function (Executive)

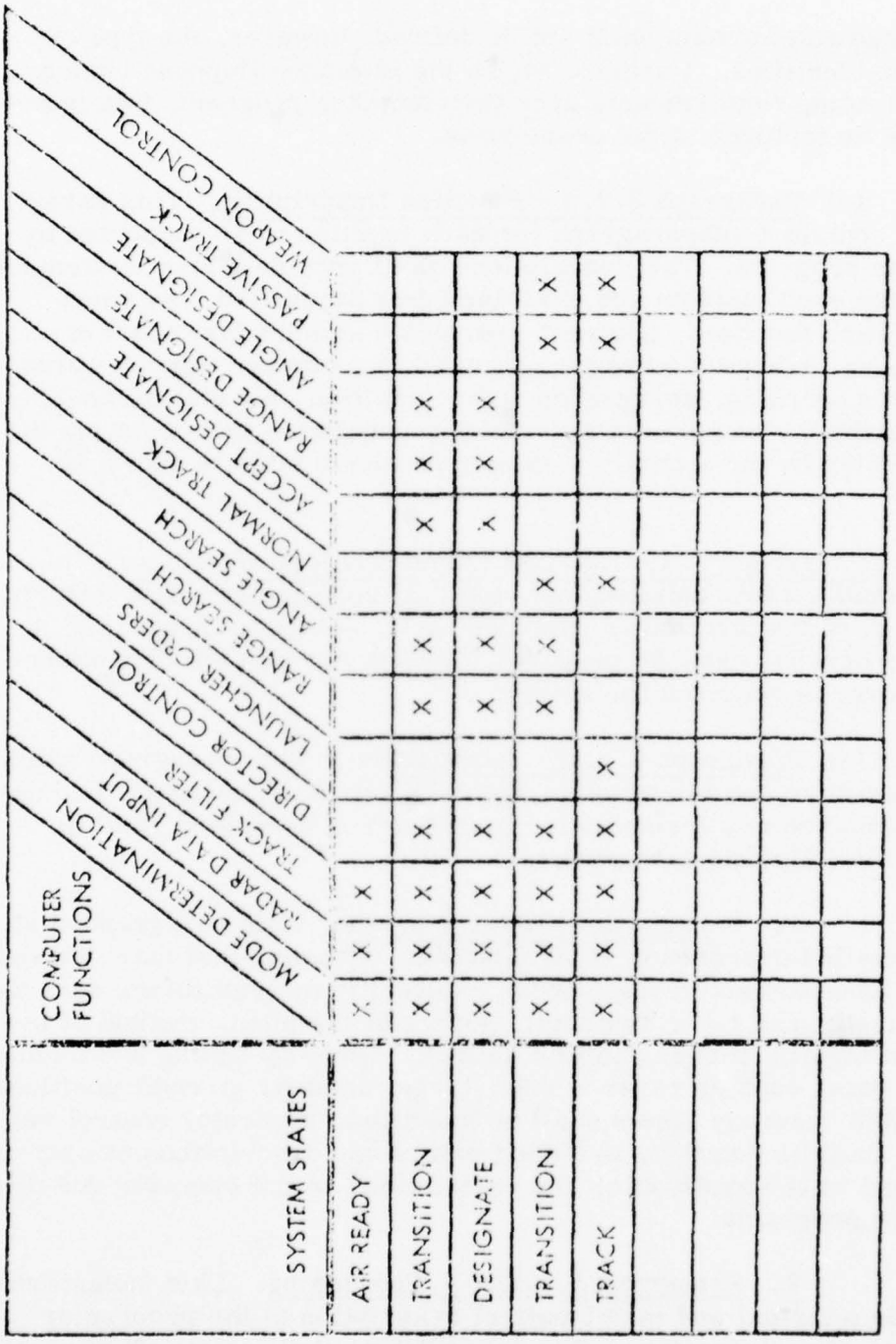

Figure 2. Sample Cross-Correlation Table of System States and Functions

face messages and formats shall not be defined, however, the type of data shall be identified. Further, where the interface imposes timing and/or sequencing requirements upon the computer program, this information shall be included in the description.

(e) Paragraph 3.2.5 - Function Description. This paragraph shall contain a subparagraph for each function to be supported by the computer program. The descriptions shall provide a brief statement of purpose for each function and shall include a simplified flow chart illustrating each function. Figure 1 provides a sample flow chart of a single function. Where the system can exist in a number of processing states, such a tracking, designation and acquisition, the states should be briefly described, and followed by a cross-correlation table showing the function affected by the states. A sample of such a table is shown in Figure 2.

(3) Paragraph 3.3 - Detailed Functional Requirements. This paragraph shall contain detailed text, logical, and mathematical descriptions for each of the functions performed by the computer program. A set of subparagraphs shall be prepared for each function (N) or subfunction, whichever is required for clarity.

(a) Paragraph 3.3.N - Introduction. This paragraph shall contain descriptive and introductory material for each function. The detailed performance requirements for each function described shall be included in the following paragraphs:

1. Paragraph 3.3.N.1 - Inputs. This paragraph shall provide a detailed description of all input data including that data derived from other functions and from sources external to the computer, such as radars, consoles and other systems. Source of the input, method of insertion, and legality checks shall be defined. Quantity timing and format of the input data, such as radar tracks, target display, aircraft position, and associated accuracy limits shall be specified. Operator control requirements shall be detailed, including names and descriptions of operator positions where applicable, and restrictions on the operator due to the computer programs.

2. Paragraph 3.3.N.2 - Processing. This paragraph shall provide a textual and mathematical description of the processing requirements of each function. The presentation shall relate all processing descriptions to the inputs defined in paragraph 3.3.N.1 and to the

resulting outputs defined in paragraph 3.3.N.3. Presentation of the descriptions under the function shall include:

a. Purpose. A description of the exact requirements of the operation(s) of the function.

b. Functional Parameters. A description of each operation specified by the function. The accompanying narrative shall identify accuracies required, sequence and timing of events, and relevant restructions or limitations such as target position accuracy, timing of servo order outputs and interval timing tolerance. Derived equations shall be shown with appropriate mathematical and control symbols defined.

c. Diagrams of Geometry. Grahpical descriptions such as target engageability and track geometry.

3. Paragraph 3.3.N.3 - Outputs. This paragraph shall provide a detailed description of all output data, such as servo orders, target gates, and display data. Method and timing of outputs shall be described completely. Output requirements for operator use (e.g., hard copy or CRT displays) must include name, content, timing format, and routing of the information.

4. Paragraph 3.3.N.4 - Special Requirements. This paragraph shall contain detailed descriptions of special data processing requirements, such as instructions for special formats to accommodate testing, recording, simulation, necessary procedures, system growth requirements, recovery requirements, and special personnel requirements. System limitations should be included. In addition, the reason for the limitations should be explained and annotated to reflect whether this is an equipment and/or computer program limitation. A notation should be included to insure that data which must be maintained during error recovery is not forgotten.

(4) Paragraph 3.4 - Adaptation. These paragraphs shall contain a description of the data base requirements with respect to the operational system environment, system parameters, and system capacities. Adaptation data is that data that can be centrally modified as needed to define the scope of operational functions within prescribed limits.

(5) Paragraph 3.5 - Capacity. This paragraph should specify constraints on capacity due to functions other than those in the complete program development contract. For example, constraints may be described such as spare core memory requirements, storage used for non-CPCI programs, and spare storage set aside for future use.

d. Section 4 - Quality Assurance Provisions. This section shall specify test requirements, methods of and the necessary tools and facilities to conduct the required tests. This section shall establish the requirements for the test plans and procedures that must be formulated for verification of the program. The intent of the Quality Assurance effort is to verify that the performance requirements as stated in Section 3, Requirements, have been met. The following paragraphs shall be included:

(1) Paragraph 4.1 - Introduction. This paragraph shall establish the requirement for development of a test plan and test procedures for the subject program. It shall specify which of the following levels of testing must be performed and which must be formally documented.

(a) Computer subprogram testing.

(b) Computer program testing.

(c) Computer program acceptance testing.

(d) System integration testing.

(2) Paragraph 4.2 - Test Requirements. This paragraph shall specify the requirements for performing each level of testing except the acceptance test level. For each level, the tools and facilities required shall be specified. The requirements shall include test formulas, algorithms, techniques and acceptance tolerance limits.

(3) Paragraph 4.3 - Acceptance Test Requirements. This paragraph shall establish the means by which the procuring agency may formally accept the computer program as fulfilling the performance requirements as stated in Section 3, Requirements. It shall explicitly define those performance requirements presented which become a part of the acceptance testing, and shall also define the level of testing and documentation required. System capacities, accuracies, and limitations shall also be used to define specific tests to be performed for acceptance.

From these requirements, this paragraph shall derive and define the acceptance or failure of each test. The tests may be performed using either simulated or actual environments. However, whichever technique is used, is shall be defined with a description of the test and acceptance/failure criteria.

e. Section 5 - Notes. This section shall include information that is stated for administrative convenience only, and is not a part of the specification in the contractual sense, e.g., it shall not include requirements that constrain design or development, or qualify the performance requirements. This section shall include a list of all documents, specifications, etc., that are useful for program development and that are not included with this specification.

f. Appendix A - Mathematical Analysis. This section shall be included as an appendix to the computer program performance specification. It shall include textual and pictorial material to elaborate and refine the material presented in Section 3, Requirements. These items may include:

(1) Paragraph A.1 - Mathematical Derivations.

(2) Paragraph A.2 - Alternate Method.

(3) Paragraph A.3 - Summary of Equations.

(4) Paragraph A.4 - Definitions of Terms.

(5) Paragraph A.5 - Reference Documents.

g. Appendix B - Miscellaneous Items. This section shall include all other items that:

(1) Are bound separately for convenience (e.g., classified appendix, or a large body of statistical data).

(2) Are of a temporary nature (e.g., interim performance requirements for early testing which may add to, delete, or change in some way the requirements established in Sections 3 and 4).

(3) Are used for reference purposes only.

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
USAF	DI-E-30140 (Mod)

1. TITLE

Computer Program Product Specification

3. DESCRIPTION/PURPOSE

The computer program product configuration identification documentation (specification) establishes the detailed technical description of the computer program configuration item (CPCI) to be delivered under the terms of the contract.

4. APPROVAL DATE

14 July 1976

5. OFFICE OF PRIMARY RESPONSIBILITY

AFSC

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP

1. The computer program product specification is used to identify the contractual requirements (product baseline) for the CPCI. The product specification is the documentation to which engineering change proposals (ECPs) are addressed. The product specification will normally be prepared as Part II of a two part specification. Part I of the specification will, however, always be the overriding part of the specification.

2. The computer program product specification is used to describe the evolution of the CPCI from the Development Specification (DI-E-30139) through the completed Product Specification. Formerly UDI-E-3120B-ASD

9. REFERENCES (Mandatory as cited in Block 10)

AFSCM/AFLCM 375-7
MIL-STD-483 (USAF)
MIL-STD-490
AFR 800-14, VOL II, dated 26 Sep 75

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

1. General Requirements. The Computer Program Product Specification shall specify the design description of the computer program based upon the performance requirements defined in the Computer Program Development Specification. It shall specify the programming approach for implementing the computer program and shall define how the functions are to be performed. The Computer Program Product Specification shall be contained in loose leaf binders and shall be periodically updated to reflect the current status of the computer program development process.

2. Detailed Requirements. For convenience in describing the minimum essential content, the following paragraphs show a normal format for presentation of the material. In the following description, paragraph headings and numbers indicate the general nature of the topic, and are minimum mandatory requirements.

a. Section 1 - Scope. This section shall contain the computer program title and provide a brief summary of the purpose and scope of the specification. It shall also contain a description of the major functions of the computer program.

b. Section 2 - Applicable Documents. This section shall list the Computer Program Development Specification standards, and other documents which apply to the preparation of this specification and to the utilization of the computer system to which the specification pertains. These shall include, but not be limited to: programming reference manuals, maintenance manuals, military specifications and standards.

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c. Section 3 - Requirements. This section shall contain a comprehensive description of the computer program design structure and processing. The description shall reflect the translation of the computer system functions defined in the Computer Program Development Specification to the design of the computer program.

(1) Paragraph 3.1 - Function Allocation/Description. This paragraph shall identify and contain the individual computer subprograms. The identification of tasks shall be derived from the performance requirements in the Computer Program Development Specification. A complete description of the specific design structure (e.g., modular, through-put, segmented) to be implemented for translating the functions into subprograms and their subsequent processing shall be defined in detail. An example of a computer program structure is illustrated in Figure 1. In addition, this paragraph will include a list of the task or tasks followed by the subprogram title, followed by its subprogram mnemonic designator. The information specified in paragraph 3.2 below may be included as the last item in this list, if clarity is maintained.

(2) Paragraph 3.2 - Functional Description. This paragraph shall describe a general summary of inputs, outputs, and functions to be performed for each subprogram and common subroutine. The subprogram designator shall be listed followed by the summary of inputs, outputs, processing, and functions performed by the subprogram. The description shall identify the specific data required as input and its sources. Similarly, the output data shall be identified along with the required destination of the data. This paragraph shall summarize any known or anticipated limitations of the computer program. A listing of all restrictions and constraints which apply to the computer program shall be provided including timing requirements, limitations of algorithms and formulas used, limits for input and output data, associated error correction sensing, and the error checks programmed into the computer program. In addition, the interface between the subprograms and executive routine shall be defined. This definition shall include scheduling requirements, such as rate or conditions, when more than one is applicable.

(3) Paragraph 3.3 - Storage and Processing Allocation. This paragraph shall describe the allocation of memory storage and processing time to subprograms, the executive routine, subroutines and the data base. In addition, the timing, sequencing requirements, and equipment constraints used in determining the allocation shall be described. These

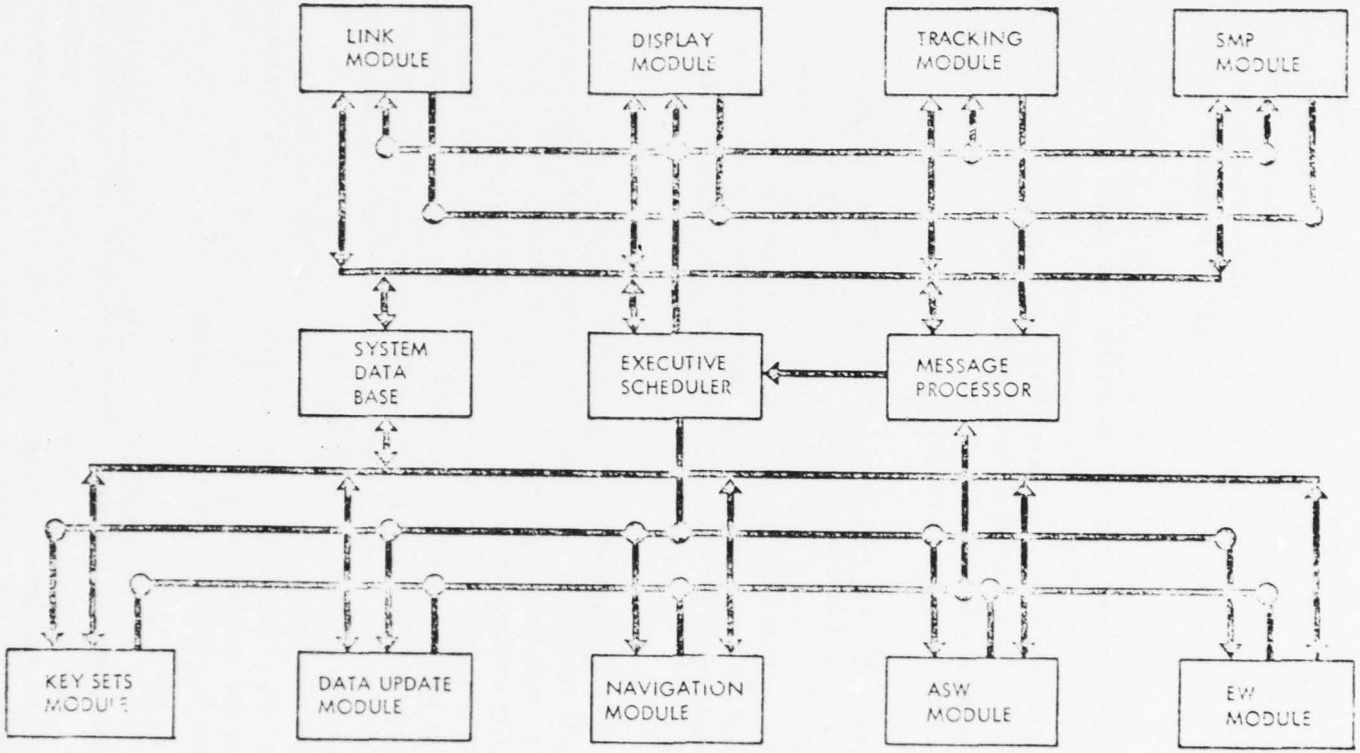


Figure 1. Sample of a Modular Program Structure

allocations are approximations in a draft specification and are not binding, but they should be made as close as possible to the storage space that will be needed. The total memory allocation and processing time for each subprogram and common data base shall be summarized shown in Figure 2. In the final specification, actual allocations should be used.

(4) Paragraph 3.4 - Computer Program Functional Flow Diagram. This paragraph shall describe and show the general system flow of both data and control. If the computer program is designed to operate in more than type one mode (i.e., air mode, surface mode, etc.), each mode shall be clearly distinguishable in both the text and the flow diagrams. Figure 3 illustrates a functional flow processing diagram and Figure 4 illustrates a data flow diagram.

(a) Paragraph 3.4.1 - Program Interrupts. This paragraph shall list all program interrupts and describe their effort on designing the control logic. Each interrupt must be fully described as a source, purpose, type, and the required response of the executive control. The probable rate of occurrence of interrupts shall also be given. This description shall be in the same functional terminology as in CPDS paragraph 3.1.

(b) Paragraph 3.4.2 - Logic Subprogram Reference. This paragraph shall contain a detailed description of the control logic involved in referencing each subprogram. This descrption shall include a refinement of the information presented in CPDS paragraph 3.4.1 and shall be a direct outgrowth of the functional requirements and the timing constraints imposed by the program interrupt logic. The details concerning the assignment of priorities and permissible cycle times to the subprograms must be included as part of this discussion. Flow diagrams shall be used to clarify the control logic. For example, subprograms A, B, and C always require execution at 16 Hz rate, and subprogram D is executed only when called by B. The basic computation cycle then is defined as 16 Hz, and the means for determining D scheduling shall reflect the conditions that must exist for the call by B to be made.

1. Paragraph 3.4.2.1 - Computer Subprogram 1. The basic paragraph shall identify the computer subprogram by including, as a minimum, the computer subprogram nomenclature, including its abbreviations and assigned designator. It shall also include a brief abstract of the tasks the computer subprogram, the language in which it is written, and its major functional interfaces. The computer subprogram shall then be described in detail in subparagraphs.

SUBPROGRAM TITLE	MEMORY ESTIMATES	MAX. PROCESSING TIME PER SECOND
Mode Control	2,000	128.0 MS
Coordinate Conversion	900	256.0 MS
Radar Control	5,000	196.0 MS
Weapon Control	2,100	100.0 MS
Target Engageability Auto Request SWC Target	2,000 1,500 500	10.0 MS 5.0 MS 5.0 MS
Equipment Scheduler Recommend Execute	3,000 1,800 1,200	15.0 MS 10.0 MS 5.0 MS
Display	3,000	30.0 MS
Tracking	2,000	150.0 MS
Executive	1,000	80.0 MS
Data Base	2,000	N/A
TOTAL	25,000 Words	965 MS/SEC

Figure 2. Sample Memory and Processing Time Allocation

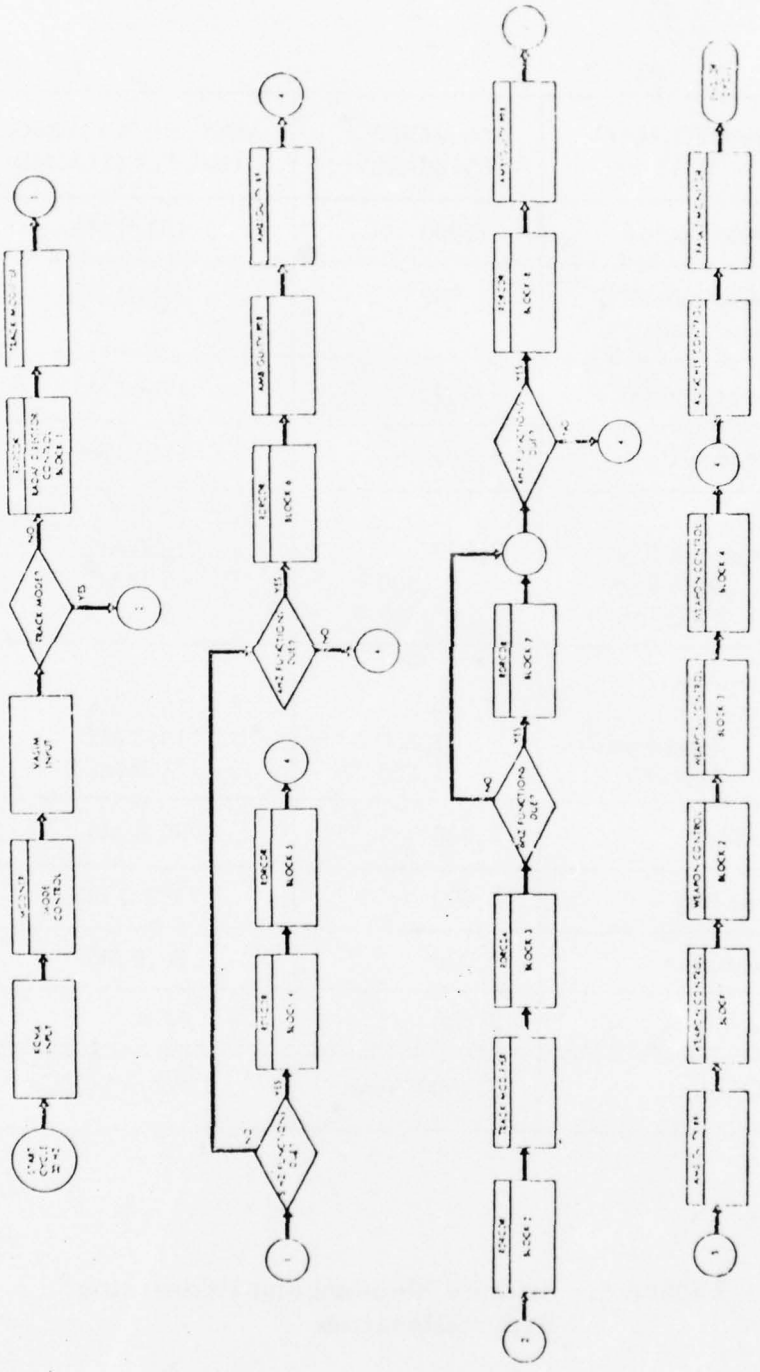


Figure 3. Sample Functional Flow Diagram

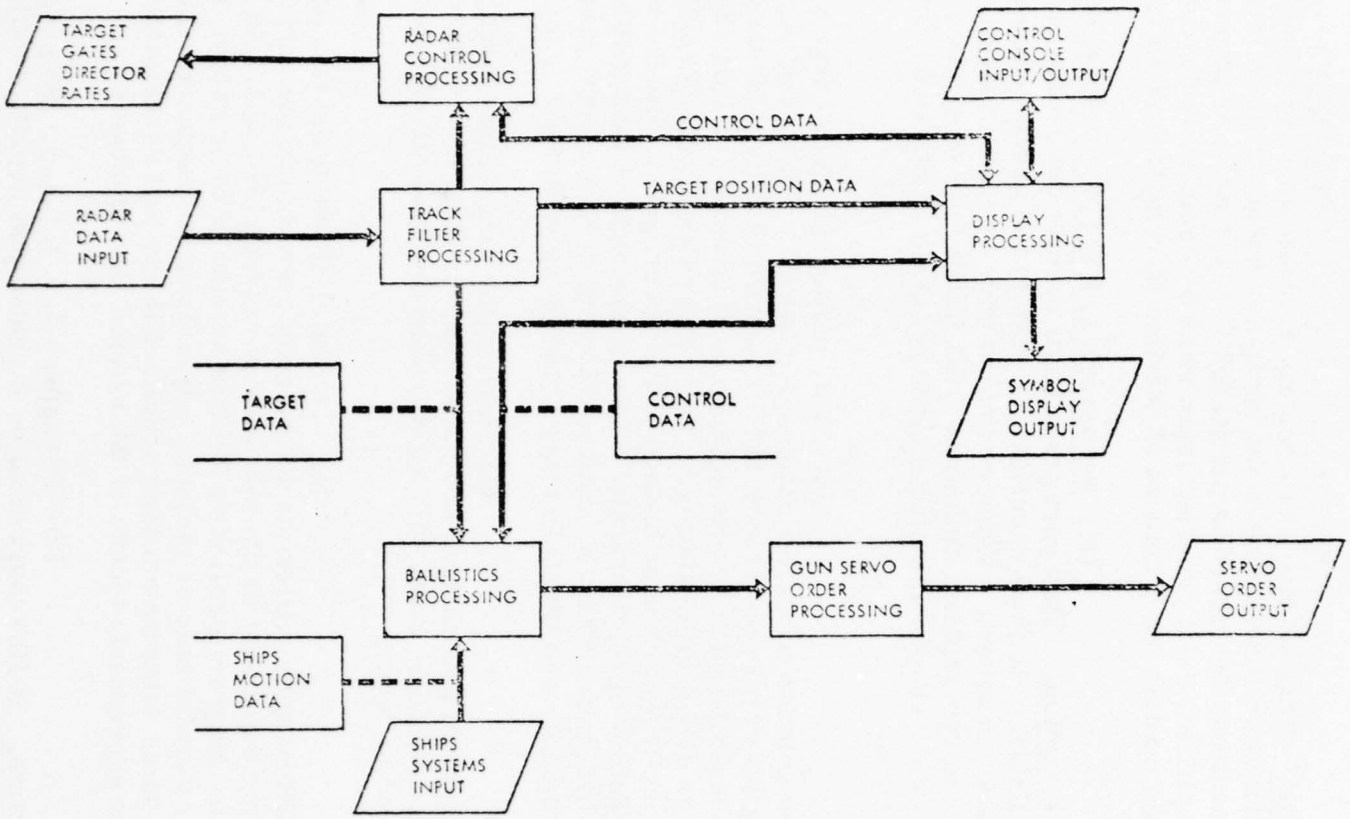


Figure 4. Sample Computer Program Data Flow Diagram

a. Paragraph 3.4.2.1.1 - Subprogram Requirements. This section shall contain a comprehensive description of the structure and functioning of the computer subprogram in total. All major functions described in paragraph 3.4.2.1 must be presented and fully amplified. All program logic shall be completely described. The minimum content shall consist of detailed information as follows:

(1) Paragraph 3.4.2.1.1.1 - Subprogram Detailed Description. This paragraph shall specify the design of the subprogram in detail. It shall describe completely the processing requirements of the subprogram. When combined with a program listing, flowchart, and data description, this area shall fulfill the requirements of individuals whose responsibilities include program production, maintenance, and modification.

(a) This paragraph shall contain a narrative description of the operations performed by the subprogram. It shall be organized by subprogram tags (mnemonic labels) and shall completely describe each section of code as it appears (or will eventually appear) in the subprogram listing. This, in essence, will describe the operations performed at each branch of the subprogram, and the results obtained by following each branch. Those subprogram tags that are common branch points from several sections of code (or text) need only be described once, and thereafter need only be referenced.

(b) During the discussion of subprograms, if common system subroutines are used, they shall be identified by their function and mnemonic label with a reference to the document where they are described in detail.

(c) The level of detail for this portion of the specification amplifies the information provided in the subprogram flow diagrams described in the following paragraph (3.4.2.1.1.2). Since the usual flow diagram presents a limited amount of information, flow diagrams are useful only as pictorial adjuncts to the required text description. The same subprogram tags specified in the text description shall be shown in the appropriate blocks of the related flow diagrams.

(2) Paragraph 3.4.2.1.1.2 - Subprogram Flow Diagrams. A flowchart shall be included that depicts detailed operations performed by the computer subprogram. The flowchart shall specify all operations performed and include all equations used in

mathematical computations. Figure 5 illustrates the level of detail required for these flow diagrams.

(3) Paragraph 3.4.2.1.1.3 - Computer Subprogram Environment. This paragraph shall contain a general description of the subprogram environment. The overall format selected for this section shall be designed to facilitate the rapid retrieval of data base information. Throughout the specification, references will be made to subroutines, constants and control-registers, input buffers and tables, output buffers and tables, priority/interrupt tables, etc. Since many of these tables and control-registers contain data that are referenced by more than one subprogram, it is required that the detailed description of this common data base be a part of the Common Data Base Design Specification (DE-3912-ASD), which is used as a central source of reference for subprogram environment data. The following paragraphs specify the level of detail that is required for the computer program product specification.

(a) Paragraph 3.4.2.1.1.3.1 - Tables. This paragraph shall contain the detailed description of each table used only in the subprogram data base. Each table shall be described individually, where the descriptions are presented according to the alphabetical ordering of the mnemonic table names. The content of the subprogram table descriptions shall be as defined for describing common data base tables in paragraph 3.1 of the Common Data Base Design Specification DI-E-30144. The minimum content of the subprogram table description shall be:

1. Table Name.
2. Purpose and Type.
3. Size and Indexing Procedure.
4. Structure and Bit Layout.

(b) Paragraph 3.4.2.1.1.3.2 - Variables. This paragraph shall contain the detailed description of each variable included only in the subprogram data base. Each variable shall be described individually where the descriptions are presented according to the alphabetical ordering of the mnemonic names of the variables. The content of the subprogram variable descriptions shall be as defined for

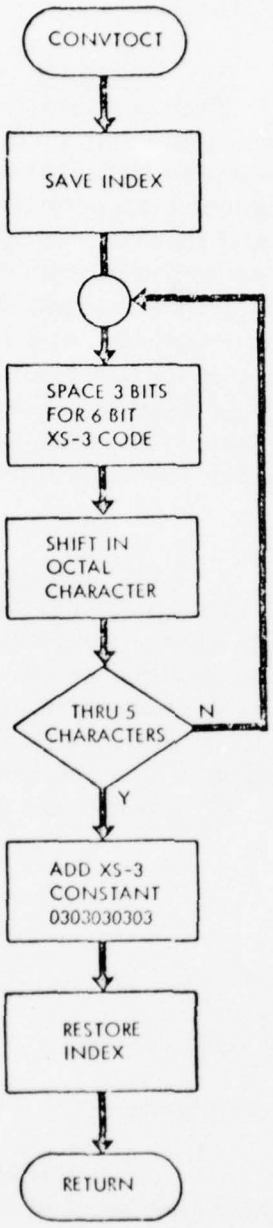


Figure 5. Sample Subprogram Flow Diagram for a Detailed Operation (Convert Octal to Excess 3)

common variables in paragraph 3.2 of the Common Data Base Design Specification (UE-3912-ASD). The minimum content of this paragraph shall be:

1. Variable Name.

2. Purpose.

3. Structure and Bit Layout.

(c) Paragraph 3.4.2.1.1.3.3 - Constants. This paragraph shall contain the detailed description of each constant included only in the subprogram data base. It shall follow the same requirements and form as paragraph 3.4.2.1.1.3.2.

(d) Paragraph 3.4.2.1.1.3.4 - Flags. This paragraph shall contain the detailed description of each flag included only in the subprogram data base. Each flag shall be described individually, where the descriptions are presented according to the alphabetical ordering of the mnemonic names of the flags. The content of the subprogram flag descriptions shall be as defined for common flags in paragraph 3.4 of the Common Data Base Design Specification. The minimum content of this paragraph shall be the following information:

1. Flag Name.

2. Purpose and Status.

3. Structure and Bit Layout.

(e) Paragraph 3.4.2.1.1.3.5 - Indices. This paragraph shall contain the technical description of each index included only in the subprogram data base. Each index shall be described individually, where the descriptions are presented according to the alphabetical ordering of the mnemonic names of the indices. The content of the subprogram index descriptions shall be as defined for common indices in paragraph 3.5 of the Common Data Base Design Specification. The minimum content for this paragraph shall be:

1. Index Name.

2. Purpose.

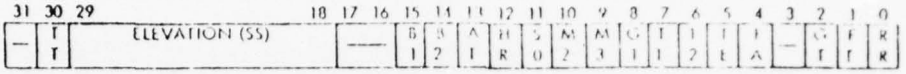
(f) Paragraph 3.4.2.1.1.3.6 - Common Data Base Reference. This paragraph shall provide a complete list of all common data base items referenced by each subprogram. This list provides a cross reference to the Common Data Base Design Specification which provides the technical description of the common data base items.

(4) Paragraph 3.4.2.1.1.4 - Input/Output Formats. This paragraph shall contain a brief description and graphic (sample) representation of each input and output message, card format, tape format, etc., processed by the subprogram. If the volume concerns a common system subroutine, a detailed explanation and graphic representation of the input and output registers to and from the subroutine shall be provided. This shall include scaling and bit-position information (see Figure 6).

(5) Paragraph 3.4.2.1.1.5 - Required System Library Subroutines. This paragraph shall list in alphabetical order all system library subroutines used by the computer subprogram. It shall describe the area of the functional description where use is made of the system library subroutine and the document number where the subroutine can be located. For example:

System Subroutine Name	Used	Document Reference
RTN (Arc Tangent)	3.2.3	Computer Subprogram Design Document Volume 10
SQS (Square Root)	3.2.1	Computer Subprogram Design Document Volume 10

(6) Paragraph 3.4.2.1.1.6 - Conditions for Initiation. This paragraph shall identify system conditions that must be met for this subprogram to be initiated for processing. For those subprograms that are always initiated for processing regardless of system conditions, the word "UNCONDITIONAL" shall be shown. For those subprograms that are initiated due to one or more unique conditions, each possible condition or set of conditions shall be described. If the conditions are based on the settings of certain items of information, each item, its required value, and a definition (or reference) of that value shall be shown.



FIELD	DESCRIPTION	UNITS	SCALING
TT	Test Target - Interpret as a non-tactical track		
ELEVATION (SS)	A value expressing the elevation angle at which the radar is to conduct its Sector Search. Minimum value is 1 degree. Maximum value is 85 degrees. MSB = X, LSB = Y.	BAMS	12
B1	Sector 1 Blanking - Interpret as first sector in which the radar is blanked during Horizon Search Mode.		
B2	Sector 2 Blanking - Interpret as second sector in which the radar is blanked during Horizon Search Mode.		
AT	Alternate Air Target - Interpret as order to select alternate air fuzing for the appropriate missile type when the LS is assigned to the appropriate MR.		
HR	Horizon Search Request - Interpret as order to alert the console associated with the appropriate MR to a Horizon Search Request.		
SO	Sector Search Order - Interpret as place appropriate MR in Sector Search Mode. Associated with Elevation (SS).		
M2	Missile Radar 2 - Interpret as a modifier.		
M3	Missile Radar 3 - Interpret as a modifier.		
G1	Gun Radar 1 - Interpret as a modifier.		
T1	TDT-1 - Interpret as a modifier to any data associated to indicate source of data.		
T2	TDT-2 - Interpret as a modifier to any data associated to indicate source of data.		
TE	Terminate Engagement - Interpret as Break Track on associated MR/GR and proceed to any subsequent engagement requirements. Subject to legality checks.		
FA	Fire Again - Fire again on appropriate track. Subject to legality checks.		
GT	Gun Target - Interpret as a GR-1 function and route status to GR-1.		
FT	Fast Target - Interpret as associated with field HR with appropriate MR. Does not apply to GR-1.		
RR	Release MR/GR - Interpret as Break Track with no further engagement requirements and return MR/GR to Air Ready mode.		

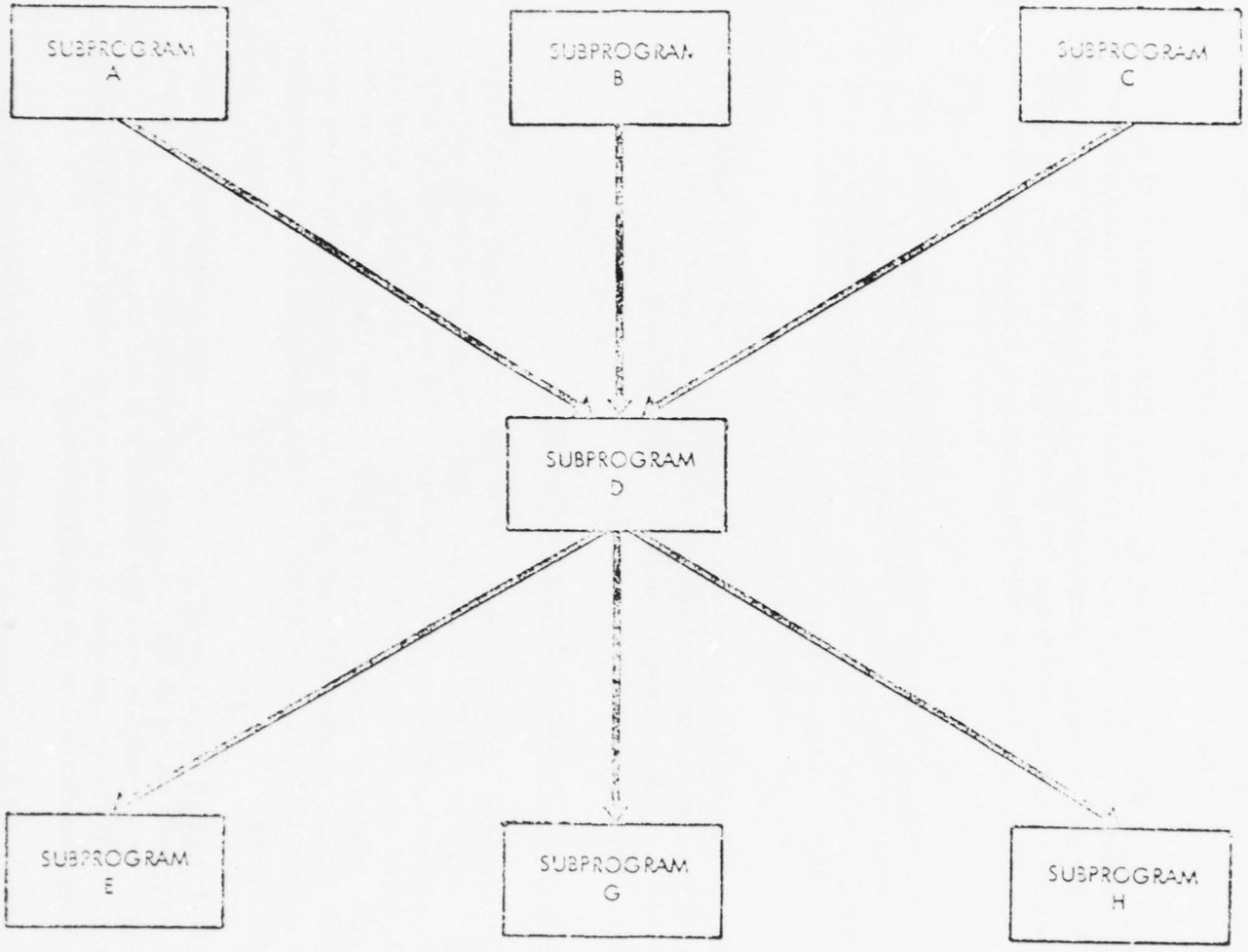
Figure 6. Sample Input/Output Word Format Description

(7) Paragraph 3.4.2.1.1.7 - Subprogram Limitations. This paragraph shall summarize any known or anticipated limitations of the subprogram. A list of all restrictions and constraints that apply to the subprogram shall be provided, including timing requirements, limitations of algorithms and formulas used, design limits of input and output data, associated error condition sensing provided, and the "error" or "reasonableness" checks that are programmed into the various routines.

(8) Paragraph 3.4.2.1.1.8 - Interface Description. This paragraph and an associated block diagram shall show the sequential and functional relationship of the subprogram with other subprograms and system subroutines or executive with which it interfaces. Figure 7 illustrates the block diagram showing the relationship between subprograms.

(c) Paragraph 3.4.3 - Special Control Features. This paragraph shall describe all the special control features which affect the design of the control logic but are not part of the normal operational functions (e.g., system loop tests for routine maintenance).

(5) Paragraph 3.5 - Programming Guidelines. This paragraph shall specify the programming guidelines to be observed by the system programmer when producing the computer program. This paragraph shall name the programming language and its supporting system, i.e., monitor, loader, librarian, debug routines and utilities, that will be used to produce the computer program. The appropriate users manuals and specifications for the language and system shall be referenced. This paragraph shall also state, in concise terms, the mnemonic labeling conventions to be observed in development of the computer program. These conventions shall include rules for defining mnemonic statement labels and tags, as well as program version identification to facilitate configuration management. For example, a track filter routine within the subprogram TRACKER could be assigned a mnemonic name TFILTER. In this instance, the character "T" denotes that the labeled element is a part of the subprogram TRACKER. "FILTER" is the descriptive mnemonic assigned to the subroutine. Further, if the subroutine TFILTER contained three statements that required labels, the labels TFILTER1, TFILTER2, and TFILTER3 could be assigned respectively. For these labels, the "T" identifies the label as being within subprogram TRACKER, "FILTER" identifies that the label appears within the subroutine FILTER, and the



NOTE: Arrows indicate subprogram reference or call.

Figure 7. Sample Block Diagram of Subprogram D Interface Relationship and Calling Sequence

number suffix is the unique field used to prevent duplicate labeling and indicates the relative order in which the labels appear.

d. Section 4 - Quality Assurance. Normally, Section 4 of a specification contains quality assurance provisions and acceptance test requirements for follow-on production process for a computer program; thus, the concept of acceptance tests for production items will not apply to a CPCI. Instead, Section 4 of this specification will contain two sub-sections:

(1) Test Plan/Procedure Cross Reference Index. This sub-section will contain a cross-reference diagram depicting each function (as delineated in the computer program development specification) and relating these functions to the corresponding test plan/procedures that were used to qualify the individual requirements.

(2) Other Quality Assurance Provisions. This subsection will reference and/or specify the test/verification requirements, methods and procedures which apply to preparation and duplication of the computer program (i.e., tapes, card decks, etc.).

e. Section 5 - Computer Program Package.

(1) General Requirements. The Computer Program Package (CPP) shall consist of all the items necessary for the procuring agency to produce and maintain the computer program. These items shall include, but not be limited to: the computer program source card deck, equivalent magnetic tape, object program tape, a source deck listing, an error free source/object listing produced by an assembly or compilation of the source decks, and a complete cross-reference listing produced by a compilation of the source decks.

(2) Detailed Requirements. The following paragraphs define each of the required items in the Computer Program Package. Delivery of the package shall coincide with the delivery of the final product specification. All items are mandatory except as noted and apply also to the Common Data Base Design Specifications:

(a) Source Computer Program. This item shall be the complete source form of the computer program suitable for assembly or compilation. The physical form of the source program may be card decks, or equivalent magnetic tapes. In either case, the form of the

source program shall be compatible with the production facility to which the program is delivered. For example, card readers may differ in their interpretation of the physical punches on a card for certain alphanumeric symbols. If this is the case, it is the contractor's responsibility to conform to production facility formats.

(b) Object Program Tape. This item shall be the complete object form of the computer program, suitable for loading and execution in the operational computer. The object program shall be obtained from an error free assembly or compile of the source computer program, and be completely free of patches.

(c) Source Program Listing. This item shall be a listing of the source computer program delivered. The listing shall be an exact duplication of the delivered media.

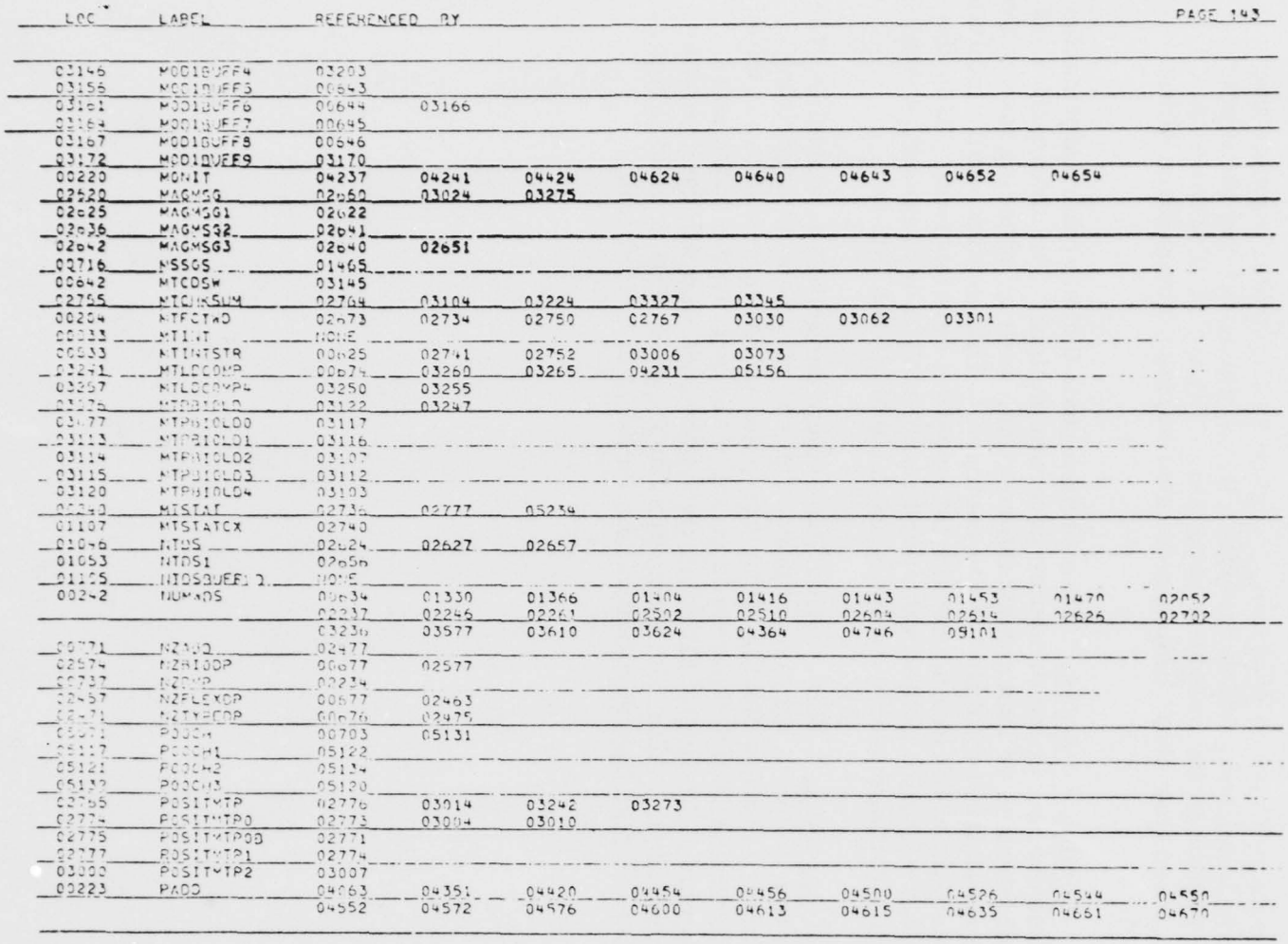
(d) Source/Object Listing. This CPP item shall be a listing of the combined source statements and resulting object machine instructions generated during an assembly or compile of the delivery source program. Figure 8 illustrates a typical source/object listing. The source/object listing shall be error free and be an exact presentation of the delivered source and object program. If the supporting compiler or assembler system does not provide source/object listing, then the minimum requirement is the object listing.

(e) Cross-Reference Listing. This item shall be a listing showing a cross-reference table of each mnemonically labeled statement in the computer program and each statement in the computer program that references the labeled item. The table shall be ordered alphabetically according to the mnemonic labels and shall be generated as the result of an assembly or compile of the delivered source computer program. Figure 9 illustrates a cross-reference listing where the labels are alphabetically listed on the left side of the page, and the address of each reference to the label are listed across the remainder of the page. This item is not required if it cannot be produced by the assembler or compiler used.

(f) Miscellaneous Listings. The following items shall be included as available from the assembler or items may include such listings as automatically generated subprogram flow charts, data base summary listings, load maps and program summary data listings. Each of these items may be generated as a result of an assembly or compilation

```
CARD NO  L1 ID    LOC    F JKB    Y       LABEL     L1 STATEMENT AND NOTES                                    PAGE 00059
                  50665  21005  00000
                  50666  60400  50704
         03352                                      FC   CHANGE CATEGORY*EIMP
         03353                                      FC   COMMENT*SCHNGTRK
         03354    50667  10000  00001              SET  CMB(CMBX,LHW)*EQ*1
                  50670  12650  00303
                  50671  14026  00500
         03355    50672  11024  03400              SET  CMB(CMBX,GTYPE)*EQ*CDTRK(J,GTYPE)
                  50673  02000  00001
                  50674  10000  03777
                  50675  57056  00500
         03356    50676  11004  00000              SET  CMB(CMBX,TNT)*EQ*J
                  50677  10040  77400
                  50700  57016  00500
         03357    50701  16516  00501              SET  CMB(CMBX+1,LHW)*EQ*K
         03360    50702  12750  00402              EIMP SCHNGTRK
                  50703  65020  77650
         03361    50704  12010  53567  ESTRIDS6   SET  ETID(UPX,07*TO*0
                  50705  16036  53700
         03362                          ESTRIDS6   FC   CLEAR THIS REQUEST FOR SHIP DATA
         03363    50706  16026  53724              SET  ETID(UPX,1)*TO*0
         03364                                      FC   DECREASE NO. OF REQUEST
         03365    50707  37060  53570              INCR ESHREQ*BY*-1
       2 03366                          ESTRIDS7   FC   END OF REQUEST STRING*YES*THEN*INCREMENT UNPACK INDEX*THEN*GOTO*E
         03367    50710  11020  53567  ESTRIDS7   IF   UPX*LT*PKX*THEN*INCR*UPX*THEN*GUTO*ESTRIDSEE
                  50711  21010  53567
                  50712  60400  50716
                  50713  60700  50716
                  50714  36010  53567
                  50715  61000  50554
         03370                                      FC   CLEAR UNPACK INDEX
         03371    50716  16010  53567              SET  UPX*EQ*0
         03372                          ESTRIDS8   FC   ALL REQUESTS PROCESSED*NO*ESTRIUS1
         03373    50717  11060  53570              IF   ESHREC*NOT*0*THEN*GOTO*ESTRIDS1
                  50720  60500  50540
         03374                                      FC   CLEAR PACKING AND UNPACKING INDICES
         03375    50721  16030  53567              SET  MTPKX*EQ*0
         03376    50722  16010  53573              SET  MTSRCH*EQ*0
         03377                                      FC   REWIND TAPE*REWINDD
         03400    50723  12710  00337              REWINDD   SYSSHIPD*0
                  50724  10000  00000
                  50725  65020  77644
         03401                                      FC   RETURN TO PERIODIC*EPLPCN
         03402    50726  65010  77661              EPLPCN
         03403                                      FC   RETURN
         03404                          ESTRIDSR   FC   SET ID
         03405    50727  12620  53567  ESTRIDSR   SET  ETID(PKX,ID)*EQ*A
                  50730  10030  53545
                  50731  57036  53700
         03406    50732  10053  00500              SET  ETID(PKX,MN)*TO*CMB(I,LHW)
                  50733  14016  53724
         03407                                      FC   SET REQUESTING MODULE
         03410    50734  16010  50477              SET  ESTRIDL*TO*0
         03411                                      FC   ESTRIDSBB
         03412    50735  61000  50525              GOTO ESTRIDSBB
```

Figure 8. Sample Source/Object Listing



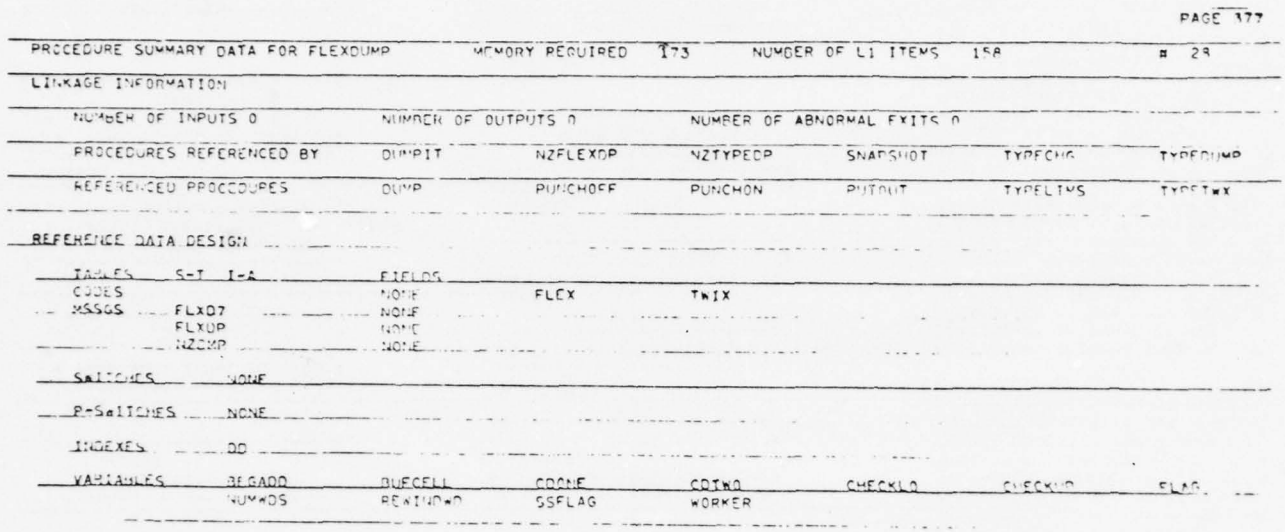
```
LOC   LABEL      REFERENCED BY                                                    PAGE 143

03146 MOD1BUFF4  03203
03156 MOD1BUFF5  00643
03161 MOD1BUFF6  00644   03166
03164 MOD1BUFF7  00645
03167 MOD1BUFF8  00646
03172 MOD1BUFF9  03170
00220 MONIT      04237   04241   04424   04624   04640   04643   04652   04654
02520 MAGMSG     02660   03024   03275
02625 MAGMSG1    02622
02636 MAGMSG2    02641
02642 MAGMSG3    02640   02651
02716 MSSGS      01465
00642 MTCDSW     03145
02755 MTCHKSUM   02704   03104   03224   03327   03345
00204 MTFCTAD    02673   02734   02750   02767   03030   03062   03301
00233 MTINT      NONE
00933 MTINTSTR   00625   02741   02752   03006   03073
03241 MTLCOMP    00674   03260   03265   04231   05156
03267 MTLCOMP4   03250   03255
03276 MTPBIOLO   03122   03247
03177 MTPBIOLO0  03117
03113 MTPBIOLO1  03116
03114 MTPBIOLO2  03107
03115 MTPBIOLO3  03112
03120 MTPBIOLO4  03103
02240 MTSTAT     02736   02777   05234
01107 MTSTATCX   02740
01046 MTUS       02624   02627   02657
01053 MTUS1      02656
01105 MTUSBUFF1  NONE
00242 NUMADS     00634   01330   01366   01404   01416   01443   01453   01470   02052
                 02237   02246   02261   02302   02510   02604   02614   02626   02702
                 03236   03577   03610   03624   04364   04746   05101
00771 NZMD       02477
02574 NZRIOOP    00677   02577
02737 NZOMP      00234
02567 NZFLEXOP   00677   02463
02571 NZTXECOP   00676   02475
05071 POOCH      00703   05131
05117 POOCH1     05122
05121 POOCH2     05134
05132 POOCH3     05120
02765 POSITMTP   02776   03014   03242   03273
02774 POSITMTP0  02773   03004   03010
02775 POSITMTP0B 02771
02777 POSITMTP1  02774
03000 POSITMTP2  03007
03223 PADD       04063   04351   04420   04454   04456   04500   04526   04544   04550
                 04552   04572   04576   04600   04613   04615   04635   04661   04670
```

Figure 9. Sample Cross-Reference Listing

of the delivered source program. Figure 10 illustrates a procedure summary data listing which describes the environment and parameters of each routine in the computer program. Figure 11 illustrates a computerized flow chart listing generated during a compilation of the program.

f. Section 6 - Notes. This section shall include other information applicable for use in the computer program design. The information might be administrative or background information, such as ordering instructions for technical data pertaining to the contract. This section shall also list all documents which are necessary for program development. This list shall include applicable software documents such as a compiler, assembler, and utility package user's manuals not included in Section 2.

g. Appendix. This section shall comprise separate appendices for information and data that are required for completeness in describing the structure and functioning of the computer program system as a whole and that may be listed separate from the main body of the document. For example, a listing of all common subroutines that will be available can be included. Also, the Computer Subprogram Product and Common Data Base Design Specification can be included or referenced.



```
                                                                                    PAGE 377
PROCEDURE SUMMARY DATA FOR FLEXDUMP        MEMORY REQUIRED  173     NUMBER OF LI ITEMS  158          #  29

LINKAGE INFORMATION

    NUMBER OF INPUTS 0          NUMBER OF OUTPUTS 0          NUMBER OF ABNORMAL EXITS 0

    PROCEDURES REFERENCED BY    DUMPIT      NZFLEXDP    NZTYPEDP    SNAPSHOT    TYPECHG     TYPEDUMP

    REFERENCED PROCEDURES       DUMP        PUNCHOFF    PUNCHON     PUTOUT      TYPELTMS    TYPETWX

REFERENCE DATA DESIGN

    TABLES   S-T  I-A           FIELDS
    CODES                      NONE        FLEX        TWIX
    MSGS     FLXD7             NONE
             FLXDP             NONE
             NZCMP             NONE

    SWITCHES    NONE

    P-SWITCHES  NONE

    INDEXES     DD

    VARIABLES   BEGADD          BUFCELL     CDONE       CDTWO       CHECKLO     CHECKUP     FLAG
                NUMDS           REMNDR      SSFLAG      WORKER
```

Figure 10. Sample Procedure Summary Data Listing

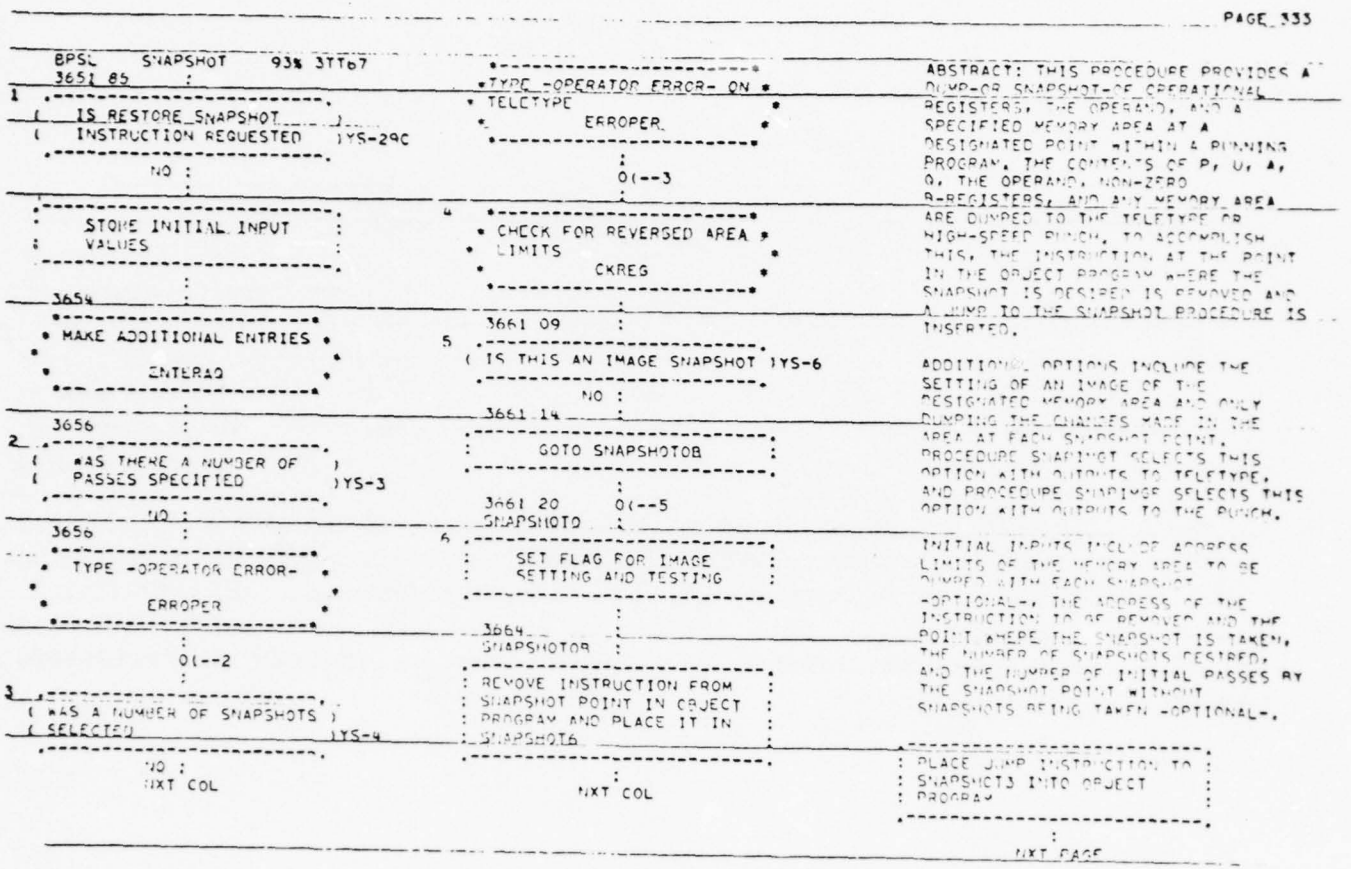


Figure 11. Sample Flowchart Listing

ADDENDUM TO DI-E-30140

COMPUTER PROGRAM PRODUCT SPECIFICATION

Detailed flow charts, in addition to narrative and listings, are required to describe each computer program component. However, in a structured programming environment such flow charts are not produced and are considered unnecessary because of the improved readability of the structured source code listings produced. Flow charts, therefore, are not required where structured programming techniques are used.

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S)	
	AGENCY	NUMBER
1. TITLE Interface Specification	USAF	DI-E-30141 (Mod)
3. DESCRIPTION/PURPOSE Specifications in this category shall provide sufficient detail to enable evaluation and control of physical and functional design inter-relationships of interdependent components, equipment, subsystems, segments, systems, or facilities	4. APPROVAL DATE 15 Oct 1973	
	5. OFFICE OF PRIMARY RESPONSIBILITY AFSC	
	6. DDC REQUIRED	
	8. APPROVAL LIMITATION	
7. APPLICATION/INTERRELATIONSHIP Specifications in this category shall include, as applicable but shall not necessarily be limited to: (a) Configuration and all interface data applicable to the envelope, mounting, and mating of the assemblies and subsystems. (b) Complete interface engineering requirements interconnecting data and design limitations such as mechanical, electrical, electronic, hydraulic, pneumatic, optical, etc., which affect the physical or functional characteristics of cofunctioning assemblies. DI-E-3145 is a companion item for drawings and lists. Formerly UE-3700-ASD	9. REFERENCES (Mandatory as cited in block 10) MIL-STD-490 MIL-STD-483 (USAF)	
	MCSL NUMBER(S)	

10. PREPARATION INSTRUCTIONS

a. Interface specifications (IFS's) shall be prepared and used to identify, define, and control interface requirements between system segments or configuration items (CI's) which cannot be adequately portrayed in graphic form. Interface specifications which define interface design constraints between system segments or configuration items shall be referenced in the respective design specifications. The interface specification will be written as a one part specification only. Interface requirements and constraints normally included in Part II of a two (2) part specification shall be incorporated as requirements in the Part II specifications of each of the CI's associated with the interface.

b. Interface Specification shall be documented on 8-1/2" X 11" sheets utilizing standard specification practices of MIL-STD-490. The title page shall be prepared in accordance with the sample format illustrated in Figure 1 attached. IFS shall establish the performance design interface requirements in sufficient detail to enable evaluation and control of the physical and functional interrelationships of interdependent systems, segments, configuration items, or facilities. The IFS shall include the following:

1.0 SCOPE

1.1 Item Description. Include in this paragraph an identification and brief description of the interfacing system segments, CI's and/or equipments.

DD FORM 1 JUN 68 1664

1.2 Contractors. The principal contractor who has prime responsibility for the interface and each participating contractor shall be named as shown below:

Principal - (enter name of principal contractor)
Participant - (enter name of participating contractor)

2.0 APPLICABLE DOCUMENTS. This paragraph shall list those documents (specifications, standards, drawings, bulletins, manuals, etc.) that are specified in the IFS. With the exception of interface documents (IFS/ICD's) these documents shall be identified as the current authorized document which established the requirement. Interface documents (IFS/ICD's) shall be listed by their basic identification number and title only. The introductory statement for this paragraph and the general grouping of documents shall be in accordance with MIL-STD-490.

3.0 INTERFACE REQUIREMENTS. The interface between system segments or configuration items shall be identified and defined in this paragraph. This definition shall contain sufficient detail so that the associate contractors will be able to agree on one interpretation of the interface and hence be able to proceed with assurance that the produced hardware and/or computer software will mate and/or function in accordance wi with prescribed requirements. The defined interfaces shall include, but not be limited to, the following types: Physical, Functional Environmental and Safety.

An outline is presented below for each type of interface identified above. If a certain paragraph is not applicalbe, the paragraph heading shall be followed by the words "Not Applicable."

3.1 Physical. Physical interface is the common boundary between two or more hardware items that connect, fit, or have a mechanical interrelationship and has design effects on one or more system, segment, or CI. This paragraph shall define all physical and mechanical interfaces and detail specific interface requirements including but not limited to applied loads, center of gravity locations, weight and balance, material specificatins, dissimilar metals, and dimensions and tolerances. Applic able Interface Control Drawings (ICD's) shall be referenced where appropriate.

3.2 Functional. Functional interface is a juncture of two or more functions that interact, or of a function which has a design effect on another contractor's system, segment, or CI. These functions are derived fromsystem requirements and represent finite and discrete actions

to be accomplished by equipment, personnel, facilities, or a combination of the three. Functional interfaces shall be defined and their specific requirements detailed within this paragraph. This shall include, but not be limited to, the following technical areas: Electronic, Electrical, Hydraulic, Pneumatic, Optical, Crew Provisions and Display/Control, and Weapon Control. Applicable ICD's shall be referenced where appropriate. Three potential paragraph subdivisions and related minimum informational requirements are shown below. Other identified functional interface technical areas shall be defined in a similar manner.

3.2.1 Electronic. Electronic interfaces and their specific interface requirements shall be defined in this paragraph. This shall include, but not be limited to, the following details: Voltages AC and DC, Frequencies, Current, Shielding requirements, Signal characteristics, Signal circuit impedance, and Related tolerances.

3.2.2 Electrical. The electrical interfaces and their specific interface requirements shall be defined in this paragraph. This shall include, but not be limited to, the following power considerations: Type (AC or DC, nominal frequency, nominal voltage, number of phases), Quality (steady state and transient voltage, wave form and frequency characteristics), and Quantity.

3.2.3 Hydraulic and Pneumatic. Hydraulic and/or pneumatic interfaces and their specific interface requirements shall be defined in this paragraph. This shall include, but not be limited to, the following considerations: Type of power, Power transmission interface, Pressure required, Flow rate, Temperature, Ground operations interface, and Percentage of fluctuation permissible of fluid as related to flow, pressure and temperature.

3.3 Environmental. Environmental interfaces apply to system equipment interfaces having a direct design or performance effect on the system segment or CI controlled by another associate contractor. Environments at each interface shall be defined and specific requirements detailed. This definition shall address, but shall not be limited to, such factors as vibration envelopes, shock levels, pulse shapes, acceleration, aerodynamic, temperature, heating rates, acoustical noise, air conditioning requirements, and contamination control requirements. Applicable ICD's shall be referenced where appropriate.

3.4 Safety. This paragraph shall define those requirements which are basic to the design of either or all associate contractors segments or CI's with respect to equipment characteristics, methods of operation and environmental influences and which will prevent personnel injury and equipment degradation without degrading equipment operational capabilities. These requirements shall include, but not be limited to, such things as: Restricting the use of dangerous materials, Explosion proofing, Control of ground and captive flight radiation of electromagnetic energy, Grounding provisions, Gas detection and warning, and Decontamination requirements. Applicable ICD's shall be referenced where appropriate.

4.0 QUALITY ASSURANCE PROVISIONS. This paragraph shall identify and define the inspection and test requirements necessary to verify the designed hardware and/or computer software compliance with the specified interface requirements of Section 3.

5.0 NOTES. The contents of this paragraph are not contractually binding. Background information, administrative notes, definitions, etc., may be included in this paragraph.

c. Interface Specifications shall be jointly developed and coordinated by all contractors and Government agencies affected by the interface and shall be submitted to the Government for approval.

SAMPLE FORMAT

Specification Number _____

Date (Day-Month-Year)

INTERFACE SPECIFICATION

(Name) Segment to (Name) Segment

or

(CI Title and No.) to (CI Title and No.)

APPROVAL/CONCURRENCE

	Organization	Signature	Date
AF/PO	_____	_____	_____
Principal Contractor	_____	_____	_____
Participating Contractor	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Figure 1

ADDENDUM TO DI-E-30141
INTERFACE SPECIFICATIONS

Revise Block 7 to read:

Specifications in this category shall include, as applicable but shall not necessarily be limited to:

(a) configuration and all interface data applicable to the envelope, mounting, and mating of the assemblies and subsystems.

(b) Complete interface engineering requirements inter-connecting data and design limitations such as mechanical, electrical, electronic, hydraulic, pneumatic, optical, etc., which affect the physical or functional characteristics of confunctioning assemblies.

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S).	
AGENCY	NUMBER
USAF	DI-S-3604 / S-126-1 (Mod)

1. TITLE

Functional Flow Diagrams

3. DESCRIPTION/PURPOSE

This initial step in the system engineering process consists of the formulation of a functional description of the system activities. This functional description represents a block diagram portrayal of the functions which must be met to satisfy total system needs and so represents the genesis of subsequent detail requirements determination. Functional block diagrams are drawings to be approved and released internally within a contractor's facility and are used

4. APPROVAL DATE: 1 Nov. 1971

5. OFFICE OF PRIMARY RESPONSIBILITY:

6. DDC REQUIRED:

8. APPROVAL LIMITATION:

7. APPLICATION/INTERRELATIONSHIP (cont)

This DID provides functional flow descriptions that will be used when defining training device requirements and supports the functional description requirement of Data Item Description UDI-M-A005.

9. REFERENCES (Mandatory as cited in block 10)

MCSL NUMBER(S):

10. PREPARATION INSTRUCTIONS

The contractor shall prepare functional flow diagrams as follows:

1. Functioning Numbering. Functions on top-level functional diagram shall be numbered 1.0, 2.0, 3.0, etc. Functions which further indenture these top functions shall contain the same parent identifier and shall be coded at the next decimal level for each indenture. For example, the first indentured function 3.0 would be 3.1, the second 3.1.1, the third 3.1.1.1, etc. In expansion of a higher level function within a particular level of indenture, a numerical sequence shall be used to preserve the continuity of function. For example, if more than one function is required to amplify the function 3.0 at the first level of indenture, the sequence shall be 3.1, 3.2, 3.3, ...3.n. In expansion of function 3.3 at the second level, the numbering shall be, 3.3.1, 3.3.2, 3.3.n. Where several levels of indentures appear on a single functional diagram, the same pattern shall be maintained. While the basic ground rule shall be to maintain a minimum level of indenture of any one particular flow, it may become necessary to include several levels to preserve the continuity of functions and to minimize the number of flows required to functionally depict the system. The general criteria for the number of functions and level of indentures appearing on any particular flow shall be accuracy and clarity of presentation based on judgment.

DD FORM 1 JUN 68 1664

Description/Purpose (Continued)

as an integral part of the system engineering documentation process. The functional description is also an aid in developing, interpreting, and providing standardization necessary to accomplish interfaces between contractors and in defining requirements of training devices.

Preparation Instructions (Continued)

2. Function Reference. Each functional diagram shall contain a reference to its next higher functional diagram through the use of a reference block. For example, function 4.3 should be shown as a reference block in the case where the functions 4.3.1, 4.3.2, 4.3.n, are being used to expand function 4.3; reference blocks shall also be used to indicate interfacing functions as appropriate.

3. Function Box. Each separate function on a functional diagram shall be presented in a single box inclosed by a solid line as depicted in figure 1. Boxes used for reference to other flows shall be indicated as partially inclosed boxes to be labeled "Ref." Each function may be as gross or detailed as required by the level of functional diagram on which it appears, but it shall stand for a definite, finite, discrete action to be accomplished by equipment, personnel, facilities, or any combination of the three. Questionable or tentative functions shall be inclosed in dotted boxes as depicted by figure 1.

4. Flow Connection. Lines connecting functions shall indicate only the functional flow and shall not represent either a lapse in time or any intermediate activity. In indicating the flow, vertical and horizontal lines between boxes shall indicate that all functions so interrelated must be performed in either a parallel or series sequence. Diagonal lines may be used to indicate alternate sequences (cases where alternate paths lead to the next function in the sequence). In this latter case, the use of a diagonal line indicates that any of the functions so interrelated will lead to the next indicated function.

5. Flow Direction. Functional diagrams shall be laid out so that the functional flow is from left to right and the reverse flow, in the case of a functional loop, from right to left. Primary input lines shall enter the

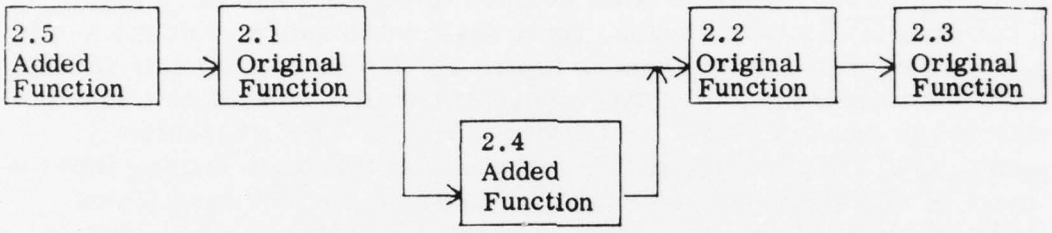
function box from the left side; the primary output or "go" line shall exist from the right and the "no go" line from the bottom of the box. However, where other considerations dictate a different arrangement to highlight a physical area, level of maintenance, or other significant consideration, a different arrangement may be employed.

6. Summing Gates. A circle shall be used to depict a summing gate. As in the case of functional boxes, lines shall enter and/or exit the summing gate as appropriate (reference figure 1). The summing gate is used to indicate the convergence or divergence of parallel or alternate functional paths and is annotated with the terms "AND" or "OR" respectively. The term "AND" is used to indicate that parallel functions leading into the gate must be accomplished before proceeding into the next function or that paths emerging from the "AND" gate must be accomplished after the preceding function. The term "OR" is used to indicate that any of several alternate paths (alternate functions) converge to or diverge from the "OR" gate. The "OR" gate thus indicates that alternate paths may lead to or follow a particular function.

7. GO/NO Paths. The symbols "G" and "NG" are used to indicate "GO" and "NO GO" paths. The symbols are entered adjacent to the lines leaving a particular function to indicate alternate functional paths. (Reference function 4.3.7).

8. Numbering Procedures for Changes to Functional Diagrams. In order to provide a rapid means of changing flows without causing extensive or chain reaction revision of numbering, the following procedure shall be used. Additions of functions to existing data shall be accomplished by locating the new function in its correct position without regard to sequence of numbering. The new function shall be numbered using the first unused number at the level of indenture appropriate for the new function.

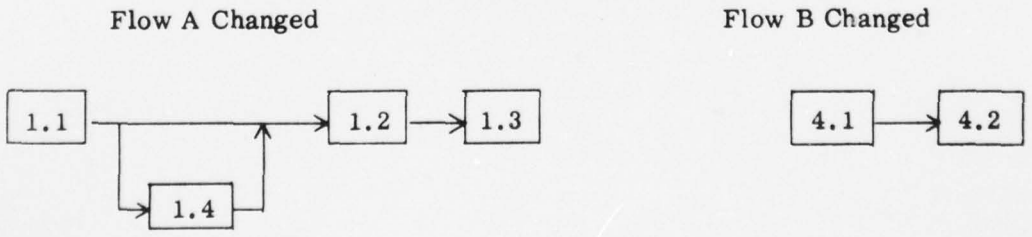
Example:



When previously established functions must be redelegated to a different functional string, the function to be moved shall be considered retired and the new location of that function shall be considered as a new addition to the acquiring strings and shall be treated as above.

Example:

Change: Function 4.3 from flow B to flow A.



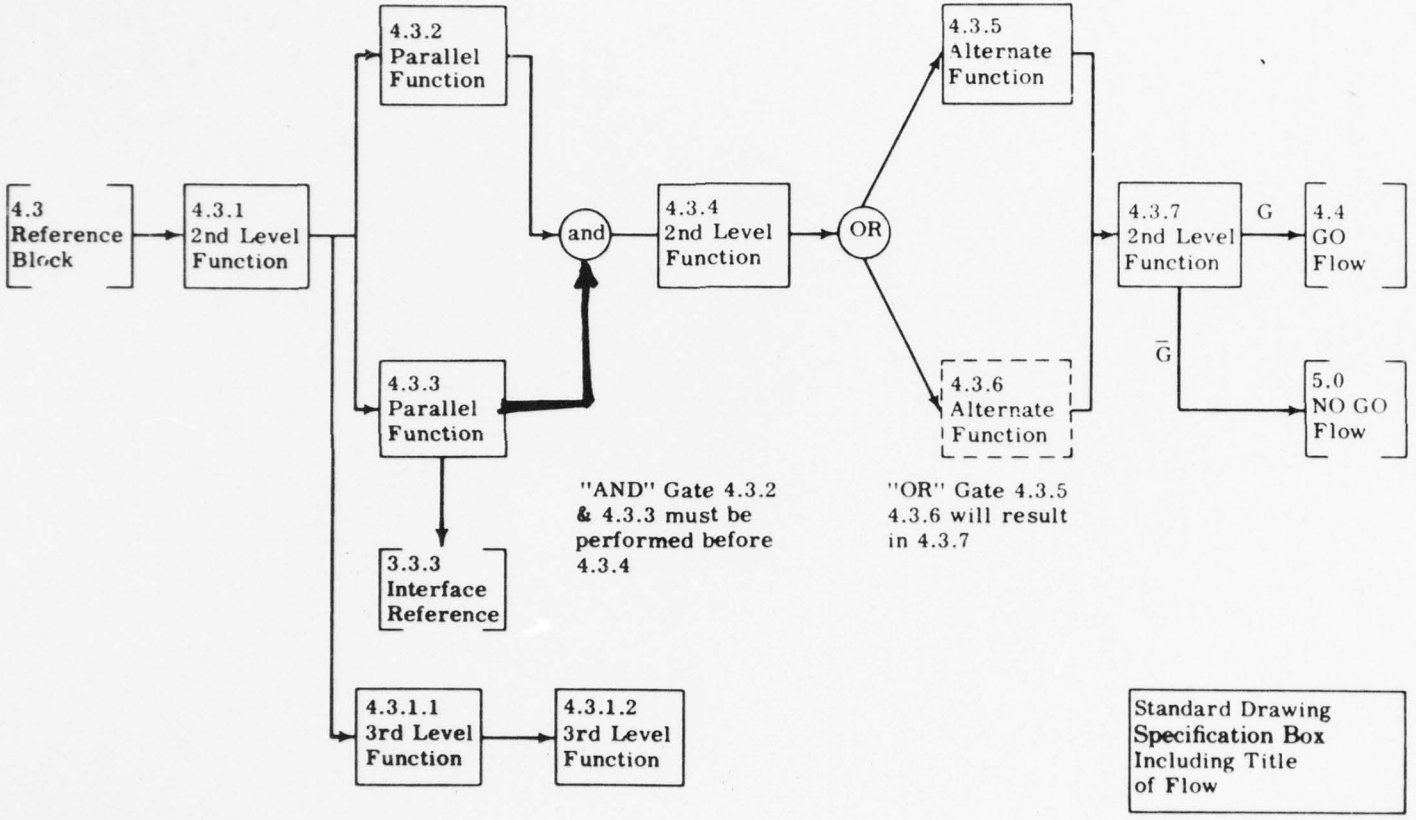


Figure 1. Basic Technique for Developing Schematic Block Diagram

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S)	
	AGENCY	NUMBER
1. TITLE Technical Publications for Development Programs	USAF	DI-M-3413/ H-114-2 (Mod)
3. DESCRIPTION/PURPOSE To obtain procedural support data, development program manuals, or similar type technical documentation required for installation, evaluation, testing, training, limited operation, maintenance, and related functions pertaining to use of equipment primarily during exploratory and/or advanced development programs.	4. APPROVAL DATE 9 Feb. 1970	
	5. OFFICE OF PRIMARY RESPONSIBILITY	
	6. DDC REQUIRED	
	8. APPROVAL LIMITATION	
7. APPLICATION/INTERRELATIONSHIP This data item description should be selectively applied by paragraph to obtain 1) a procedural support data package that is compiled primarily from existing source material and is required to accomplish tasks associated with the development effort; 2) development program manuals where a procedural support data package will not suffice for the use intended and there may be reasonable assurance that the data have a definite potential for use if technical orders are to be procured; or 3) nonspecification-type manuals required for proper operation/maintenance of R & D systems/equipments that are not expected to enter the inventory and normally will not require support.	9. REFERENCES (*Mandatory as cited in block 10*)	
	MCSL NUMBER(S)	

10. PREPARATION INSTRUCTIONS

The format, level of writing, technical content, sequence of content, etc., for preparation of the data shall be as specified by the procuring activity and shall be one of the following types as specified by the detailed instructions on DD Form 1423:

1.0 Procedural Support Data.

The contractor shall prepare homogeneous and organized groupings of procedural support data by system, subsystem, or end items which will be required for assembly, installation, operation, explosive ordnance disposal, rendering safe, maintenance, etc.

a. The contractor shall identify/prepare source material such as flow diagrams, commercial data, schematics, parts breakdown (illustrated as required), performance, model, or detailed specifications, system and maintenance analyses, test process plans, ground system test procedures, engine test directives, and other similar type documentation used to develop the procedural support data package.

b. The contractor shall identify in list form any additional source data or documents developed or to be developed whose characteristics are such that they must be revised and updated to allow the progressive development of the procedural support data package.

(continued on next page)

2.0 Development Program Manuals (continued)

The contractor shall prepare, in manual form, homogeneous and organized groupings of procedural support data by system, subsystem, and end item. These data will be supplemented by information and detail as necessary to allow use by Army personnel during development, test, or training.

a. The contractor shall identify the proposed type of manual (i.e., assembly, installation, maintenance, etc.) and shall state whether the proposed manuals are for system, subsystems, or items or combinations thereof.

b. These manuals shall generally meet the technical-manual specification requirements of the procuring activity when the manual has been identified as having a definite potential for entering the Air Force technical order inventory.

3.0 RDT & E System/Equipment Manuals (Handbooks)

The contractor shall prepare a manual suitable for the purpose required that includes, as specified on DD Form 1423, the following elements of information prepared in accordance with the following general guidelines (relaxed format and economical reproduction methods will be permitted):

a. Cover Page. Shall be printed on durable cover stock and contain the title with correct nomenclature, security information, contract number, design activities designation, and date of publication.

b. Title page. Shall present the same information as appears on the cover page.

c. Table of Contents. Shall be a complete index to all important subdivisions comprising the text of the manual, with the page number on which they appear.

d. List of Illustrations. Shall list in numerical sequence all illustrations by figure number and caption, with the page number on which they appear.

3.0 RDT & E System/Equipment Manuals (Handbooks)(continued)

e. List of Tables. Shall list in numerical sequence all tables by number and title, with the page number on which they appear.

f. Description of Equipment. Should include data such as part number model, size weight, capability limitations, cubage, power characteristics, tolerance/accuracies, external view, functional description, method of operation, etc.

g. Illustrations and Diagrams. Should include data to enable replacement parts to be ordered directly from the drawings and accompanying parts list. Diagram to be keyed to, or sufficient for use with, the text.

h. Parts Breakdown. Shall contain a complete list of parts in equipment covered by the manual. Parts list will be prepared to provide the following minimum data:

1) Item, sequence, index, or figure reference.
2) Manufacturer's part number. This must be the part number of the manufacturer of the part as identified in MIL-STD-130B.
3) Manufacturer's code. This will be the code assigned in Cataloguing Handbooks H4-1 and H4-2 for the true manufacturer of the part.
4) Item name. Parts will be identified by names assigned to similar items in Cataloguing Handbook H6-1 or name used by parts manufacturer in the drawing title.

i. Normal Operating Instructions. Should include instructions sufficient to adjust, stop/start, and operate the equipment properly. Special startup precautions, as well as other items requiring action before the equipment is put into service, should be noted.

j. Preventive Maintenance. Should cover all cleaning, inspection, and lubrication necessary to properly maintain the equipment. Inspection instructions should describe allowable wear, backlash, discoloration, etc. All lubrication

3.0 RDT & E System/Equipment Manuals (Handbooks) (continued)

instructions shall be supported by lubrication diagrams and/or figures with lubrication points indexed and recommended types of lubricants identified.

k. Scale and Corrosion Control. Shall provide information covering the prevention and removal of scale and corrosion but will not duplicate information contained in TO 1-1-2.

l. Calibration. Shall provide data required on what, how, and when to calibrate. Should include procedures for checking the equipment for reliability of reading or indications, as well as the proper use of test gauges, a list of test equipment, test points, etc.

m. Troubleshooting Procedures and Repair Instructions. Shall provide information necessary for isolating malfunctions, including symptoms, probable cause, remedies, and repair procedures adequate to return the equipment to a required standard.

n. Removal and Installation Instructions. Shall contain logical series of steps required to remove and reinstall items of equipment of an assembled unit, including a list and instructions for the use of any required tools or equipment.

o. Disassembly and Assembly Instructions. Shall provide illustrations and text required to provide the logical procedures and instructions necessary to disassemble and assemble the unit properly. Should include special precautions and instructions for use of any special tools.

p. Special Drawings. Shall include any drawings in addition to those listed above, such as wiring diagrams, system schematics, pneumatic or liquid flow diagrams, etc.

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
DOD	DI-E-7031 (Mod)

1. TITLE

Drawings, Engineering and Associated Lists

3. DESCRIPTION/PURPOSE

3.1 Provides information necessary for the acquisition of Engineering Drawings and Associated Lists to satisfy Government requirements of Level 1 (Conceptual and Developmental design); Level 2 (Production Prototype and Limited Production); and Level 3 (Production), as defined in DOD-D-1000B.

4. APPROVAL DATE

31 May 1977

5. OFFICE OF PRIMARY RESPONSIBILITY

AR

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP

7.1 This Data Item Description, is approved for use in conjunction with referenced documents (Block 9) when the later is incorporated in the contractual document as tasks to prepare Engineering Drawings and Associated Lists. When listed on DD FORM 1423, it will provide the requirements for acquisition of Engineering Drawings and Associated Lists as applicable to the "Level" specified in Block 3 of the DD FORM 1423, or referenced documents.

7.2 This DID replaces DI-E-7013A, DI-E-7014A and DI-E-7015A.

9. REFERENCES (*Mandatory as cited in block 10*)

DOD-D-1000B
MIL-STD-100B

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

10.1 Unless otherwise indicated, documents cited in DOD-D-1000B and MIL-STD-100B form a part of this data item to the extent specified.

10.2 Level 1, 2 or 3 Engineering Drawings and Associated Lists ordered for delivery shall meet the requirements of DOD-D-1000B and as defined on DD FORM 1423, in accordance with the Ordering Data (paragraph 6.2) of DOD-D-1000B, as attached or included in the contract or order.

10.3 Selection of the specific types of engineering drawings, as defined in MIL-STD-100B, required to meet a Level 2 or Level 3 procurement is the responsibility of the contractor, unless otherwise specified in the contract or order, which may exclude certain types, thereby permitting all other types as defined in MIL-STD-100B.

DD FORM 1 JUN 68 1664

PAGE 1 OF 7 PAGES

ADDENDUM TO DI-E-7031
DRAWINGS, ENGINEERING AND ASSOCIATED LISTS (LEVEL 1)

The following is added to Block 10 of DD Form 1664:

10.5 The following is in response to paragraph 6.2.1 of MIL-D-1000A:

a. Military Specification. Drawings, engineering and associated lists, MIL-D-1000A, 20 February 1976

b. Level 1. Conceptual and developmental design

c. Contractor design activity identifiers

d. Contractor design activity drawing numbers

e. N/A

f. Optional

g. Parts list

h. Not required

i. Optional

j. Upon request

k. Industry standards

l. Optional

m. Reproducible copy

n. Contractor shall retain and maintain its masters until delivery as directed by the contracting officer

o. See Page 3 of this Addendum

p. DI-E-7031

10.1--No change

10.2--No change

10.3--Drawing types required (MIL-STD-100B).

--See Page 3 of this Addendum

q. Not required

r. Yes. Restrictive legends are required if authorized by Rights in Technical Data and Computer Software, November 1974.

ENTER ONE OF THE FOLLOWING CODES AS APPLICABLE FOR EACH DRAWING GROUP AND/OR EACH TYPE:

R = REQUIRED
AS = AS REQUIRED
O = OPTIONAL
NO = NOT REQUIRED

DRAWING TYPE, PER MIL-STD-1008

O	1.	DETAIL DRAWINGS
O	1.1	Monodetail
O	1.2	Multidetail
O	1.3	Tabulated
NO	1.4	Tube bend
R	2.	ASSEMBLY
O	2.1	Detailed assembly
O	2.2	Tabulated assembly
NO	2.3	Photo-assembly
O	2.4	Inseparable assembly
R	2.5	Installation assembly
AS	2.6	Exploded assembly
R	2.7	Arrangement
R	3.	CONTROL
NO	3.1	Envelope control
AS	3.2	Specification control
NO	3.3	Source control
AS	3.4	Altered item
AS	3.5	Selected item
R	3.6	Interface control
AS	3.7	Installation control
R	4.	INSTALLATION
NO	5.	ELEVATION
R	6.	DIAGRAMMATIC
R	6.1	Schematic diagram
NO	6.1.1	Overall system
R	6.1.2	Major components
R	6.1.3	Major subassemblies
	6.1.4	Repairable assemblies
	6.1.5	Other: SEE NOTE ____
P	6.2	Connection or wiring diagram
R	6.2.1	Overall system
R	6.2.2	Major components
R	6.2.3	Major subassemblies
R	6.2.4	Repairable assemblies
	6.2.5	Other: SEE NOTE ____
R	6.3	Interconnection (overall system)
O	6.4	Single line (overall system)
R	6.5	Logic
NO	6.6	Mechanical schematic
	6.6.1	Overall system
	6.6.2	Components: SEE NOTE ____
O	6.7	Piping diagram
R	7.	SPECIAL PURPOSE
O	7.1	Book form drawings
AS	7.2	Wiring lists
NO	7.3	Numerical control drawings
NO	7.4	Optical drawings (MIL-STD-34/MIL-O-13830A)
NO	7.4.1	Detail elements (lens, prisms, etc.)
NO	7.4.2	Cemented assemblies
NO	7.4.3	Overall optical system
	7.4.4	Component system: SEE NOTE ____
P	7.5	Wiring harness
R	7.6	Cable assembly
NO	7.7	Undimensioned (0.007 mylar or equal)
NO	7.8	Printed wiring master pattern (0.007 mylar or equal)
NO	7.9	Printed wiring master drawing: SEE NOTE ____
NO	7.10	Kit drawing
	7.11	Combination of adopted items
	7.12	Ship equip.(marine item) drawing
	7.13	Certification data sheet
R	7.14	Correlation drawing: SEE NOTE ____
NO	7.15	Formulation drawing
	7.16	Contour definition
R	7.17	Modification drawing

8. NOTES

SAMPLE

ADDENDUM TO DI-E-7031
DRAWINGS, ENGINEERING AND ASSOCIATED LISTS (LEVEL 2)

The following is added to Block 10 of DD Form 1664:

10.5 The following is in response to paragraph 6.2.1 of MIL-D-1000A:

a. Military Specification. Drawings, engineering and associated lists, MIL-D-1000A, 20 February 1976.

b. Level 2

c. Contractor design activity identifiers

d. Contractor design activity drawing numbers

e. N/A

f. Optional

g. Parts list

h. Not required

i. Optional

j. Upon request

k. Industry standards

l. Yes

m. Reproducible copy

n. Contractor shall retain and maintain its masters until delivery as directed by the contracting officer

o. See Page 3 of this Addendum

p. DI-E-7031

10.1--No change

10.2--No change

10.3--Drawing types required (MIL-STD-100B).

--See page 3 of this Addendum

q. Not required

r. Yes. Restrictive legends are required if authorized by Rights in Technical Data and Computer Software, November 1974.

AD-A067 302 HONEYWELL INC MINNEAPOLIS MINN SYSTEMS AND RESEARCH --ETC F/G 5/9
PROJECT MANAGER'S TRAINING DEVICE DATA GUIDE. VOLUME II. APPEND--ETC(U)
SEP 78 N61339-78-C-0025
UNCLASSIFIED 78SRC70-VOL-2 NL

2 OF 2
AD
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END
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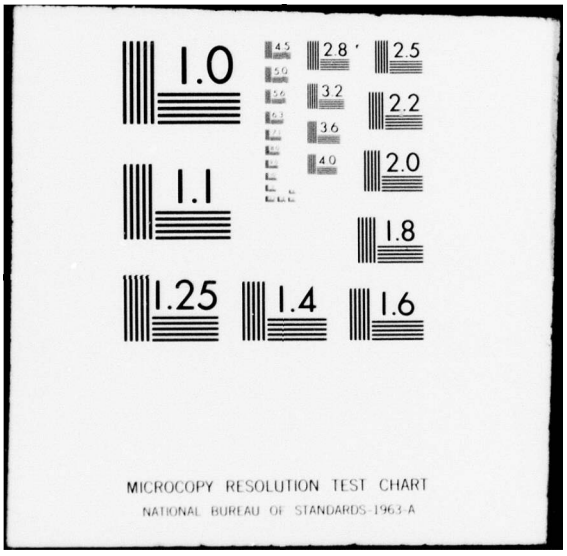
1.0
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4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ENTER ONE OF THE FOLLOWING CODES AS APPLICABLE
FOR EACH DRAWING GROUP AND/OR EACH TYPE:

R = REQUIRED
AS = AS REQUIRED
O = OPTIONAL
NO = NOT REQUIRED

DRAWING TYPE, PER MIL-STD-1008

R	1.	DETAIL DRAWINGS
R	1.1	Monodetail
NO	1.2	Multidetail
O	1.3	Tabulated
AS	1.4	Tube bend
R	2.	ASSEMBLY
O	2.1	Detailed assembly
O	2.2	Tabulated assembly
NO	2.3	Photo-assembly
O	2.4	Inseparable assembly
R	2.5	Installation assembly
NO	2.6	Exploded assembly
R	2.7	Arrangement
R	3.	CONTROL
NO	3.1	Envelope control
NO	3.2	Specification control
	3.3	Source control
	3.4	Altered item
AS	3.5	Selected item
R	3.6	Interface control
R	3.7	Installation control
R	4.	INSTALLATION
NO	5.	ELEVATION
R	6.	DIAGRAMMATIC
R	6.1	Schematic diagram
NO	6.1.1	Overall system
R	6.1.2	Major components
R	6.1.3	Major subassemblies
R	6.1.4	Repairable assemblies
	6.1.5	Other: SEE NOTE ____
R	6.2	Connection or wiring diagram
R	6.2.1	Overall system
R	6.2.2	Major components
R	6.2.3	Major subassemblies
R	6.2.4	Repairable assemblies
	6.2.5	Other: SEE NOTE ____
R	6.3	Interconnection (overall system)
O	6.4	Single line (overall system)
R	6.5	Logic
NO	6.6	Mechanical schematic
	6.6.1	Overall system
	6.6.2	Components: SEE NOTE ____
O	6.7	Piping diagram
R	7.	SPECIAL PURPOSE
O	7.1	Book form drawings
AS	7.2	Wiring lists
NO	7.3	Numerical control drawings
NO	7.4	Optical drawings (MIL-STD-34/MIL-O-13830A)
NO	7.4.1	Detail elements (lens, prisms, etc.)
NO	7.4.2	Cemented assemblies
NO	7.4.3	Overall optical system
NO	7.4.4	Component system: SEE NOTE ____
P	7.5	Wiring harness
R	7.6	Cable assembly
NO	7.7	Undimensioned (0.007 mylar or equal)
NO	7.8	Printed wiring master pattern (0.007 mylar or equal)
NO	7.9	Printed wiring master drawing: SEE NOTE ____
NO	7.10	Kit drawing
NO	7.11	Combination of adopted items
NO	7.12	Certification data sheet
R	7.13	Correlation drawing: SEE NOTE ____
NO	7.14	Formulation drawing
NO	7.15	Contour definition
R	7.16	Modification drawing

8. NOTES

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)

AGENCY	NUMBER
	UDI-M-A005

1. TITLE

Report, ITDT Front-End Analysis

3. DESCRIPTION/PURPOSE

The purpose of this data item is to define and prepare the necessary data which will allow the preparation of integrated technical documentation and training (ITDT) manuals and the design of training equipment.

4. APPROVAL DATE

5. OFFICE OF PRIMARY RESPONSIBILITY

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP

7.1 The data item will provide the information specified in MIL-M-63035 for the support of ITDT and the development of training equ pment.

7.2 Task Analysis/Task description and equipment descriptions will be used to evaluate the contractor's analyses of men in the system and the system design.

7.3 This DID will support the specification and design of training equipment.

9. REFERENCES (*Mandatory as cited in block 10*)

MIL-H-46855
MIL-M-63035

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

10.1 The Front-End Analysis (FEA) Report shall be prepared in accordance with MIL-M-63035. Task Analysis shall be performed in accordance with 3.2.1 of MIL-H-46855A

10.2 A Front End Analysis shall be performed in accordance with paragraph 3.2 of MIL-M-63035. The following outputs shall be provided:

a. Equipment Analysis (paragraph 3.2.1)

1. Equipment Breakdown
2. Tools and Test Equipment List
3. Maintenance Allocation Chart

b. Functional Analysis (paragraph 3.2.2)

1. Functional Breakdown
2. Failure Symptom Analyses
3. Block Diagrams
4. Functional Descriptions
5. Assembly Schematics
6. Detailed Assembly Schematic Descriptions

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7. Support Diagrams

c. Task Analysis (para. 3.2.3)

1. Preliminary Task Development Worksheet
2. Selection of Tasks for Training

d. Behavior Task Analysis (para. 3.2.4)

1. Task Development Worksheet
2. Task Cue and Response Worksheet
3. Cue Graphics
4. Task Steps

SAMPLE

Validation Phase

Addendum to UDI-M-A005

Report, ITDT Front End Analysis

1.0 The contractor shall prepare and furnish a front end analysis, as specified herein of the complete system being supplied. The analysis shall apply to operator and support tasks required to utilize or maintain the system.

1.1 The list of nomenclatured parts required by para. 3.2.1.1 of MIL-M-63035 shall utilize the numbering system specified in the contract for the system. The tools and equipment list need not be identified by part number where numbers have not been assigned.

1.2 Those tasks which are identified as high risk in relation to the man/machine interface are the only tasks requiring a BTA per 10.2 b. Suitable draft ITDT materials shall be developed from the analysis in order to evaluate the effectiveness of such material during OT I testing.

1.3 A preliminary report outlining critical tasks shall be provided at PDR.

SAMPLE

FSED Phase

Addendum to UDI-M-A005

Report, ITDT Front End Analysis

1.0 Same as validation phase requirements

1.1 A preliminary report for all items except 10.2d shall be provided at PDR

SAMPLE

DATA ITEM DESCRIPTION	2. IDENTIFICATION NO(S).	
	AGENCY	NUMBER
1. TITLE Simulator Design, Data Requirements	USAF	DI-T-30717(Mod)
3. DESCRIPTION/PURPOSE This document provides a listing of the data that is required in the design and construction of complex training devices. The information presented herein applies to vehicles, and/or systems where dynamic response is required to train personnel in complex weapon systems where a high level of correlation is to be between the training device and the operational weapon system.	4. APPROVAL DATE 31 May 1977	
	5. OFFICE OF PRIMARY RESPONSIBILITY	
	6. DDC REQUIRED	
7. APPLICATION/INTERRELATIONSHIP The design data specified herein shall be furnished to cover the complete operating range of the vehicle and/or systems for all normal and emergency conditions.	8. APPROVAL LIMITATION	
	9. REFERENCES (Mandatory as cited in block 10)	
	MCSL NUMBER(S)	

10. PREPARATION INSTRUCTIONS

Design data shall be documented in a form selected by the contractor and approved by the government. Any classified data shall be contained in a separate appendix.

1.0 Data Requirements

The following data shall be made available upon request by the government or their designee by the vehicle/system contractor:

a. General arrangement drawing of vehicle showing compartment stations, water lines, butt lines of crew stations from forward to rear bulkheads, floor line to top of compartment, and from maximum left to maximum right butt lines of crew stations.

b. Drawing of general arrangement of the crew station interiors identifying instruments, indicators, displays, controls, and furnishings.

c. Loft line drawing of vehicle from bulkhead forward of crew station to bulkhead aft of crew station.

d. Structural assembly, subassembly, and detail drawings of compartment and crew stations showing instrument panels and control consoles, along with panel, crew station floor, and compartment internal structure.

e. Provide field of view for all crew members showing obstructions to vision with their shape and location. This should include any visual

DD FORM 1 JUN 68 1664

aids such as periscope. This would include relationship between optical aides and procedures for alignment. This information should be provided for normal and emergency situations where crew members obtain visual information.

f. Data shall be based on the following sources in order of desirability:

(1) Field demonstrated or measured.
(2) Hot mockup.
(3) Simulation or modeling.
(4) Theoretical estimation.

When data of a higher preference becomes available, the original data shall be updated. Each set of data shall be categorized so that its source is known. Conflicts among data should be resolved on a rational basis so that all pertinent data are mutually consistent and as accurate and precise as circumstances will permit.

2.0 Motion Data

2.1 Notation of Axis System

All axis systems relationships shall be defined to provide projections of resulting forces and moments from one axis to another.

2.2 Motion Variables

Suggested motion equations shall be available when requested for each independent motion platform for stabilized and unstabilized modes. Each variable shall be defined sufficiently to enable the development of motion simulation modes.

2.3 Dynamic Characteristics

Descriptions and data shall be provided when requesting for each of the moving platforms on the vehicle that describe the motion profile over a variety of terrain. Motion platforms independent of the primary motion platform shall be characterized for stabilized and unstabilized modes. The data shall be annotated to indicate weight, center-of-gravity, enertia, and other significant conditions effecting performance.

2.4 Maximum Values

Estimated maximum values for operational conditions shall be provided when requested for such items as:

(a) Velocity
(b) Acceleration
(c) Angular accelerations and velocity

This shall include projected improvements in these factors and effects.

2.5 Weight Balance and Moments of Inertial Data

The weight, balance, and moments of intertia data shall be furnished by the contractor.

2.6 Control Systems Characteristics

The mechanical and dynamic characteristics of control system characteristics shall be provided when requested. This shall include the control of all independent motion platforms, and shall include as a minimum the following:

(a) Drawings of control systems from control to actuator.
(b) Control deflections versus vehicle or platform movement.
(c) Mechanical or power boost system characteristics (include malfunction characteristics if applicable).
(d) Artificial feel characteristics.
(e) Control characteristics and responses for operational
(f) control situation.
(f) Transfer functions of control servos.

3.0 Power Train System Data

The following information shall be provided when requested for the power train:

(a) Curves showning fuel flow for a variety of speed and power conditions.
(b) Control position versus speed under a variety of load conditions.
(c) Time response of controls to engine speed, acceleration, deceleration, or other measurable responses.
(d) Where emergency or alternate controls are used completely describe the characteristics and transients which occur during transfer of primary control.

(e) Range and nominal values of pressure, temperature, and other monitorable conditions.
(f) Specific power train operating instructions for normal and emergency conditions.
(g) Malfunctioning data shall be presented for various type of engine and power train failures. The data shall include the indications of failure, the corrective action required, the results of the applied corrective action, and the results to the power train, vehicle, or related systems if appropriate action is not taken.

4.0 Systems Data

Data for these systems shall be provided when requested in such a form as to completely describe or define the systems' operation. A functional block diagram for each system shall be provided. Static, dynamic, and transient conditions shall be defined in sufficient detail to permit accurate duplication of system response, characteristics, and indications. Data for those systems which inherently contain dynamic response characteristics, for example, a hydraulic system, shall be presented in mathematical equation form. In addition, when subsystem, configuration item, component specification control drawings or specification sheets and other related drawings and specifications are compiled, then such data shall be furnished for the respective component or system. The systems data shall include various cases of system failures defining cause and effects. The normal and emergency operation shall be given for each system. Data shall include the indications of malfunction and/or failure, the corrective action, and the results to the system if the appropriate action is not taken.

4.1 Electrical Systems Data

Electrical systems data shall include:

(a) Circuits and schematics of electrical systems and electronic system installations.
(b) An electrical load analysis.
(c) Voltmeter, ammeter, power meter and frequency meter readings as a function of electrical system operation
(d) Details of systems management including normal and emergency procedures.

4,2 Hydraulic and Pneumatic Systems Data

Hydraulic and pneumatic systems data shall include:

(a) A system schematic of hydraulic and pneumatic systems.
(b) Operating values of bypass valves, volume flow of pumps, volume flow through hydraulic motors, and hydraulic ram displacements.
(c) Hydraulic and pneumatic pressure readings as a function of system operation, including time histories of variations.
(d) Amplitude and rate of transient response of indicated hydraulic pressure for system loads, individually and in combination.
(e) Accumulator decay rates.

4.3 Fuel System Data

Fuel system data shall include:

(a) A description of installation and operation including schematic diagrams.
(b) Maximum and minimum rates of consumption.
(c) Details of fuel system management.

4.4 Oil System Data

If not included as a part of engine operations data, oil system data shall include:

(a) A description of operation including schematic diagrams.
(b) Details of oil systems management.

5.0 Instruments

The prime contractor shall supply when requested the following for all contractor-furnished instruments. For GFE items, the prime contractor shall supply installation information covering operating pressures, activation voltages, or other activation devices for instrument operation.

(a) Description of normal and emergency operation of instruments.
(b) Dependencies of accurate instrument outputs upon proper systems operation.
(c) Instrument malfunction data presented for various cases of

instrument failure or resulting from associated system failure.

(d) Instrument reading time histories or instrument system variation and fluctuations.

(e) Position of instrument pointers with power removed.

(f) Static and dynamic performance data shall include the effects of installation on instrument performance.

(g) Indications of instrument or system malfunctions, e.g., flags, barber pole, etc.

6.0 System Data

The prime contractor shall supply when requested the following for all contractor-furnished equipment and for contractor-modified Government-furnished equipment. The design data furnished shall describe in in detail the characteristics of the installed equipment. For GFE, equipment interfaces and installation data shall be provided. The data shall include:

(a) Input/output properties for each equipment module such as power requirements, signal characteristics (e.g., pulse duration, levels, parallel, or serial) and timing diagrams showing timing relationships of signals and other pertinent data.

(b) Test and alignment procedures.

(c) External wiring diagrams showing interfaces between equipment modules, interfaces with other systems and installation instructions.

(d) Internal schematics or functional equivalent diagrams with transfer functions or Boolean equations for each block.

(e) Design data supplied with preproduction or design approved model.

(f) Reports on contractor's test results.

(g) Detail equipment specification.

(h) Interim and final engineering reports, including narrative descriptions of each function and module.

(i) Detailed mechanical drawings of all control units, controls, indicators, and displays.

(j) Engineering change notices.

(k) Video recordings of display signals or movie films of operating display systems, with proper annotations.

(l) Descriptions of the behavior and status of a system when the controls are activated in sequences other than those specified

or recommended by the manufacturer.

(m) Mathematical models, process algorithms and computer program descriptions for all software incorporated in the weapon system whether developed by the airframe developer or his sub-contractors.

6.1 Communication and Identification Systems

(a) A detailed description of all types used in the vehicle and including the type number, modification letters, operation, operating frequencies, manufacturer, and control box type and associated indicators.

(b) System diagrams of intercabling between receivers, transmitter, control, and power sources.

(c) Control panel data covering the following shall be furnished:
  (1) Type and number of each control panel used with each type of radio receiver.
  (2) Schematic diagram of the control panels.
  (3) Drawings and photos showing mounting dimensions and types of fasteners.
  (4) Panel Manufacturer.

(d) Circuit and schematic drawings, description of operation management, and system failures or malfunctions data for aircraft intercommunication system.

6.3 Sensor System (Laser range finder, IR, etc.)

(a) Type.

(b) Number of modes and description for each type.

(c) Applicable specifications and manual document numbers for each type.

(d) Photographs, movies, or videotapes of display to illustrate effects of mode, environmental condition, type of display, failure modes, and target characteristics.

6.4 Computational System

In addition to the system information previously discussed, the following data on the Computational System is required.

This requirement should apply to any system utilizing a processor

executing software instructions or operating on data which is resident in read-only memory (ROM) or programmable read only memory (PROM).

(a) Hardware (including complete hardware architecture design disclosure):
  (1) Functional Drawings.
  (2) Memory description including word size, cycle time, etc.
  (3) Addressing capability (size and units).
  (4) CPU description including speed (Number of instructions per second).
  (5) Timing (synchronization timing pulse, frequency, etc.).
  (6) Interrupt structure.
  (7) Input/output description and transmission rates.
  (8) Interface design with other systems (data pass status lines, interrupt lines, etc.).
  (9) Data formats for I/0, interface, etc.

(b) Software
  (1) Operating system description including program control.
  (2) Programming manuals including a complete copy of the software documentation and users manuals that were required by the aircraft procurement to support the aircraft software modification.
  (3) Programming data for all modules.
    a. Mathematical Model.
    b. Flow charts and narrative description.
    c. Interaction rate or interrupt conditions.
    d. Worst-case cycle time and conditions for worst case.
    e. Detail listing of source code with descriptions.
    f. Symbol dictionary.
    g. Tactical tapes.

(c) Interface with cooperating systems
  (1) Digital/discrete I/0
    a. Description of signal, symbol name and source.
    b. Destination hardware or software.
    c. Transfer rates.
    d. Signal timing, pulses, magnitudes, lengths, etc.
  (2) Analog I/0
    a. Description of signal, symbol name and source of destination in hardware.
    b. Transfer rate.

6.5 Weapon Control System

(a) System description--computation.
  (1) Detailed circuit diagrams and narrative descriptions of theory of operation.
  (2) Detailed interface signal descriptions indicating effects of transmitted and received signals.
  (3) Detailed specification of weapon release computation, envelope computations and computed information such as steering, and blast.
  (4) Detailed interface signals and descriptions of the armament system with other systems, e.g., central computer, search sensors, etc.

(b) Stores management system
  (1) Description of controls and procedures for arming weapons.
  (2) Procedures for firing guns, launching rockets, and missiles.
  (3) Detailed wiring and electrical schematics for procedures outlined in (1) and (2) for all launch, fire and release logic.

(c) Displays
  (1) Detailed descriptions of all status displays associated with armament system.
  (2) Schematics which show how the indicators, lights, and other status devices are driven by the armament system.

6.7 Weapon Description

6.7.1 Basic data on weapon type shall be provided as follows:
  (a) Nomemclature.
  (b) Quantity per station and sequence of weapon release.
  (c) Pertinent ballistic coefficient and characteristics to predict accurate trajectory and impact point after release of weapon.

6.7.2 For each of the weapons the following data is required.
  (a) Missiles
    (1) IR homing
      a. Prelaunch procedures to prepare a missile for launch.
      b. Interface signals of missile with on-board systems.
      c. Launch criteria such as gimbal limits, etc.
      d. Lethal envelope.

(b) Guns
  (1) Firing rate (number of rounds/sec.).
  (2) Effects of recoil on vehicle.
  (3) Boresight and bullet dispersion.

(c) Rockets
  (1) Firing rate.
  (2) Number of rockets per pod.
  (3) Reaction of rocket motor on vehicle.

7.0 Sound Recording Data

The same contractor shall supply when requested sound recordings on tape as follows:

(a) Tape characteristics
  (1) Standard sound recording magnetic tape.
  (2) Recorded at 7-1/2 or 15 inches per second.
  (3) Recorded through a system with a minimum frequency response of 80 to 15,000 Hz with plus or minus 5 decibels.

(b) Recording content
  (1) Narrated sounds recorded at the crew stations.
  (2) Sounds shall include engine starting, travel under various power and speed conditions, and engine shut down. The sounds associated with the operation of weapons, gears, actuators, etc., audible at crew stations shall be recorded and identified.
  (3) Sounds of accessory equipment during normal and emergency operation which are audible to the vehicle personnel shall be recorded and identified. Warning sounds associated with emergency conditions shall be provided.

8.0 Vibration Data

Data showing the levels, frequencies, and orientation of all vibrations present at the crew stations shall be presented when requested. If data is dependent on engine and terrain conditions these conditions shall be identified.

9.0 Handbooks/Manuals

Handbooks/manuals shall be provided as specified elsewhere in the Contract Data Requirements List (CDRL).

10.0 Photographs

Photographs of the vehicle mockup, compartment, and crew stations shall be submitted upon request.

TRAINING SYSTEM APPLICABLE

DIDs

ATCH NR _____ TO EXHIBIT _____ CONTRACT DATA REQUIREMENTS LIST SYSTEM/ITEM _____

TO CONTRACT/PR _____ CATEGORY _____ CONTRACTOR _____

1. SEQUENCE NUMBER	2. TITLE OR DESCRIPTION OF DATA 3. SUBTITLE	6. TECHNICAL OFFICE	10. FREQUENCY	12. DATE OF 1ST SUBMISSION	14. DISTRIBUTION AND ADDRESSEES (Addressee – Regular Copies/Repro Copies)	
4. AUTHORITY (Data Item Number)	5. CONTRACT REFERENCE	7. DD250 REQ / 8. Resp Code (A) / 9. Input to IAC (I)	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBM/EVENT ID		
1. T001	2. Criteria List - Simulator Design 3.	6.	10.	12. See Blk 16	14.	
4. DI-H-3276	5.	7. / 8. / 9.	11.	13. See Blk 16		15. TOTAL
16. REMARKS Blk 16: See Addendum						
1.	2. 3.	6.	10.	12.	14.	
4.	5.	7. / 8. / 9.	11.	13.		15. TOTAL
16. REMARKS						
1.	2. 3.	6.	10.	12.	14.	
4.	5.	7. / 8. / 9.	11.	13.		15. TOTAL
16. REMARKS						
1.	2. 3.	6.	10.	12.	14.	
4.	5.	7. / 8. / 9.	11.	13.		15. TOTAL
16. REMARKS						

PREPARED BY	DATE	APPROVED BY	DATE

DD FORM 1 JUN 68 1423 REPLACES EDITION OF 1 APR 68, WHICH IS OBSOLETE. PAGE ____ OF ____ PAGES

SAMPLE

DATA ITEM DESCRIPTION

2. IDENTIFICATION NO(S)	
AGENCY	NUMBER
USAF	DI-H-3276 (Mod)

1. TITLE
CRITERIA LIST - SIMULATOR DESIGN

3. DESCRIPTION/PURPOSE
The Criteria List is prepared by the training device based on inputs from manufacturers of the equipment to be simulated. The list identifies technical data (from the equipment manufacturers) that is to be used as the "design to" baseline for the simulator.

4. APPROVAL DATE
17 April 1972

5. OFFICE OF PRIMARY RESPONSIBILITY
AFSC

6. DDC REQUIRED

8. APPROVAL LIMITATION

7. APPLICATION/INTERRELATIONSHIP
The Simulator Specification will include the major "design to" requirements as described in the specifications on equipment to be simulated. However, this is generally limited to requirements for the equipment and does not include other pertinent characteristics that must also be simulated. These other characteristics are described in the data on the Criteria List. The data on the list shall be "frozen" as of 30 days before similator Critical Design review.

9. REFERENCES (Mandatory as cited in block 10)

MCSL NUMBER(S)

10. PREPARATION INSTRUCTIONS

1. A Criteria List shall be prepared by the simulator contractor and shall be submitted to the Procuring Activity for approval. The list shall include identification by title, date, number, and source of drawings, technical orders, specifications, reports, etc., that will completely describe the performance, operation, and other characteristics of the items to be simulated. The Criteria List shall reflect the latest data available as of the "freeze" or cut-off-date.

2. Individual documents on the Criteria List shall be submitted to the Procuring Activity on request. The timetables for compliance with the requests shall be defined in the Data Accession Clause.

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SAMPLE

ADDENDUM TO DI-H-3276

CRITERIA LIST - SIMULATOR DESIGN

Add to Box 10:

3. The contractor shall maintian a file of all data on the design criteria list. He shall submit copies of any portion of the data when requested. The file shall be available for inspection at Program Reviews.

The contractor shall update the Design Criteria List after approval of the final submittal as follows:

a. With each approved ECP.

b. As new information becomes available which the contractor wants to use in the simulation.

APPENDIX B

SUGGESTED CONTRACT CLAUSES

What contract clauses are required?

In addition to the data item requirements it is necessary to include some contract clauses to supplement them. These contract clauses provide a means of establishing the management tools that the project manager (PM) may require to obtain the data in a timely, cost effective manner. Suggested clauses are included here with a brief description of their purpose.

(Note: Due to the unique application of these contract clauses, they are non-standard and therefore are not listed in the Defense Acquisition Circulars.)

TABLE B-1. SUGGESTED "CONTRACT" CLAUSE DESCRIPTIONS

CONTRACT CLAUSE	DESCRIPTION
Associate Contractor Clause	Establishes a contractual method for direct contact between the prime system developer and the TD developer, with the PM providing mediation where required.
Correction of Deficiencies Clause	Ensures the data items requested to support training devices development adequately meet the intention of the data item and its referenced documents.
Data Item Delivery Incentive	Ensures that the key milestones of the prime system are not considered met unless the supporting data items have been satisfactorily submitted and approved. The PM should decide whether delay of progress payments until satisfactory completion of the data items or dollar incentives constitutes the best means of enforcing these requirements.
Predetermination of Rights in Technical Data and Computer Software	Establishes at the time of the proposal any data which the contractor feels are proprietary data.
Unpriced Data Item	Ensures that the PM will have the option to request data which may fall under the unpriced data item. It is not anticipated that this would be necessary because of the data items specified, but the PM should allow him- or herself the flexibility to request additional data or data whose status is unknown to meet the objective of the program.
Training and Documentation Coordinator Clause	Assures that there is a single source of contact for obtaining information pertinent to the prime system. This will be the means for the government and the training system developer to identify the proper source for obtaining the required information in a timely manner.
Data Accession Clause	Ensures the compliance of the Contractor towards Government requests for any Contractor generated data.

ASSOCIATE CONTRACTOR CLAUSE

Establishes a contractual method for direct contract between the prime system developer and the TD developer, with the PM providing mediation where required.

To ensure the greatest degree of compatibility between the _____ _____ Corporation and the training system contractor, it is necessary that the contractor maintain close liaison with _____ _____ Corporation, hereinafter identified as the prime system manufacturer, on all matters pertaining to specifications and desired changes thereto. Therefore, the contractor agrees as follows:

(I) To coordinate and exchange directly with the training system contractor all information pertinent and essential to the development and fabrication of the training system.

(II) To furnish to the procuring contracting officer, two copies of pertinent communications between the training manufacturer and the prime contractor.

(III) To establish management and technical liaison between the training manufacturer and the prime contractor. To this end, the contractor agrees to use its best efforts to enter into a joint plan of action within the scope of this contract with the training manufacturer including but not limited to, the following areas:

(A) To make provisions for early evaluation and coordination to ensure that configuration, specifications, drawings, performance, and production planning of all involved elements are compatible.

(B) To arrange for the exchange of technical or other personnel as required between the contractor and training manufacturer test sites, or other involved locations to facilitate the integration discussed herein. A favorable climate should be created for the direct and uninhibited interchange of information affecting the integration.

(C) To arrange scheduling, performance, and checkout of subsystems.

(IV) To submit any disagreement which cannot be resolved between the contractor and the training manufacturer to the contracting officer.

(V) The contractor or any of his subcontractors shall provide the training device contractor with the component equipment parts from the prime system which the training device contractor and government agree are necessary for training device fabrication.

(VI) The cost to the training device contractor for components supplied shall be figured at that component's unit price for the production run fulfilling the prime contract.

CORRECTION OF DEFICIENCIES CLAUSE

Ensures that the data items requested to support the training devices adequately meet the intention of the data item and its referenced documents.

(I) Definitions. As used in this clause:

(A) "Deficiency" means any condition or characteristic in any supplies or services furnished hereunder which is not in compliance with the requirements of this contract;

(B) "Correction" means any and all actions necessary to eliminate any and all deficiencies; and

(C) "Supplies" means the end item furnished by the contractor and related services required under the contract. The word also includes technical data except when the contract includes the clause entitled Warranty of Technical Data.

(II) General.

(A) The rights and remedies of the government provided in this clause:

(1) shall not be affected in any way by any other provisions under this contract concerning the conclusiveness of inspection and acceptance; and

(2) are in addition to and do not limit any rights afforded to the government by any other clause of this contract.

(B) This clause shall apply only to those deficiencies discovered by either the government or the contractor 365 days after acceptance by the government of each item of supplies.

(C) The contractor shall not be responsible under this clause for the correction of deficiencies in government-furnished property, except for deficiencies in installation unless the contractor performs or is obligated to perform any modifications or other work on such property. In that event, the contractor shall be responsible for correction of deficiencies to the extent of such modifications or other work.

(III) Deficiencies in Accepted Supplies or Services.

(A) Notice to Contractor; His or Her Recommendation for Correction. If the contracting officer determines that a deficiency exists in any of the supplies or services accepted by the government under this contract, he or she shall promptly notify the contractor of the deficiency, in writing, within 60 days after discovery of deficiency. Upon timely notification of the existence of such a deficiency, or if the contractor independently discovers a deficiency in accepted supplies or services, the contractor shall submit to the contracting officer within 60 days his or her recommendation for corrective actions, together with supporting information in sufficient detail for the contracting officer to determine what corrective action, if any, shall be undertaken.

(B) Direction to Contractor Concerning Correction Deficiencies. Within 60 days after receipt of the contractor's recommendations for corrective action and adequate supporting information, the contracting officer, at his or her sole discretion, shall give the contractor written notice not to correct any deficiency, or to correct or partially correct any deficiency within a reasonable time and at the location specified by the PCO.

(C) Correction of Deficiencies by Contractor. The contractor shall promptly comply with any timely written direction by the contracting officer to correct or partially correct a deficiency, at no increase in the contract price. The contractor shall also prepare and furnish to the government data and reports applicable to any correction required under this clause (including revision and updating of all other affected data called for under this contract) at no increase in the contract price.

(D) Modification of Contract with Respect to Uncorrected Deficiencies. In the event of timely notice of a decision not to correct or only to partially correct, the contractor shall submit a technical and cost proposal within 60 days amending the contract to permit acceptance of the affected supplies or services in accordance with the revised requirement. An equitable reduction in contract price shall promptly be negotiated by the parties and reflected in a supplemental agreement to this contract.

(IV) Deficiencies in Supplies or Services Not Yet Accepted. If the contractor becomes aware at any time before acceptance by the government (whether before or after tender to the government) that a deficiency exists in any supplies or services, the contractor shall promptly correct the deficiency or, if he or she elects to invoke the procedures in (III) above, shall promptly notify the contracting officer in writing of the deficiency, with a detailed recommendation for corrective action. Any notice of deficiency shall be made in writing, which must pertain exclusively to and be specifically identified as constituting a notice of deficiency under this clause.

(V) No Extension in Time for Performance; No Increase in Contract Price.

(A) In no event shall the government be responsible for extension or delays in the scheduled deliveries or periods of performance under this contract as a result of the contractor's obligations to correct deficiencies; nor shall there be any adjustments of the delivery schedule or period of performance as a result of such correction of deficiencies unless provided by supplemental agreement with adequate consideration.

(B) It is hereby specifically recognized and agreed by the parties hereto that this clause shall not be construed as obligating the government to increase the contract price of this contract.

(VI) Transportation Charges.

(A) When the government returns supplies to the contractor for correction or replacement pursuant to this clause, the contractor shall be liable for transportation charges up to an amount equal to the cost of transportation by the usual commercial method of shipment from the place of delivery specified in this contract (irrespective of the f.o.b. point or the point of acceptance) to the contractor's plant in addition to any charges provided for by VI-B below. The contractor shall also bear the responsibility for the supplies while in transit.

(B) When compliance with the terms of this clause by the contractor involves shipment of corrected or replacement supplies from the contractor to the government, the contractor shall be liable for transportation charges up to an amount equal to the cost of transportation by the usual commercial method of shipment from the contractor's plant to the place of delivery specified in this contract (irrespective of the f.o.b. point or the point of acceptance), in addition to any charges provided for by VI-A above. The contractor shall also bear the responsibility for the supplies while in transit.

(VII) Failure to Correct. If the contractor fails or refuses to:

(A) present a detailed recommendation for corrective action in accordance with (III) above,

(B) correct deficiencies in accordance with (III-C) above, or

(C) prepare and furnish data and reports in accordance with (III-C) above, the contracting officer shall give the contractor written notice specifying the failure or refusal and setting a period after receipt of the notice within which it must be corrected. If the failure or refusal is not corrected within the specified period, the contracting officer may, by contract or otherwise, as required:

(1) obtain detailed recommendations for corrective action;

(2) (a) correct the supplies or services, or

(b) replace the supplies or services. If the contractor fails to furnish timely disposition instructions, the contracting officer may dispose of nonconforming supplies for the contractor's account in a reasonable manner, in which case the government is entitled to reimbursement from the contractor or from the proceeds for the reasonable expenses of care and disposition as well as for excess costs incurred or to be incurred; and

(3) obtain applicable data and reports; and charge to the contractor the cost occasioned to the government pursuant to VII-A, B, and C above.

(VIII) *Correction of Deficient Replacements and Reperformances.* Any supplies or parts thereof corrected or furnished in replacement and any services reperformed pursuant to this clause shall also be subject to all the provisions of the clause to the same extent as supplies or services initially accepted. The warranty with respect to such supplies, parts, or services shall be equal in duration to that set forth in II-B above, and shall run from the date of delivery of such corrected or replaced supplies.

(A) All implied warranties of merchantability and "fitness for a particular purpose" are hereby excluded from any obligation under this contract.

(B) All cost incurred or estimated to be incurred by the contractor in complying with this clause shall be considered when negotiating the total final price under the "Incentive Price Revision" clause of this contract. After establishment of the total final price, contractor compliance with this clause shall be governed by the "Equitable Adjustments Under Other Clauses" paragraph in the "Incentive Price Revision" clause of this contract.

DATA ITEM DELIVERY INCENTIVE CLAUSE

Ensures that the key milestone of the prime system are not considered met unless the supporting data items have been satisfactorily submitted and approved. The PM should decide whether delay of progress payments until satisfactory completion of the data items or dollar incentives constitutes the best means of enforcing these requirements.

Criteria for Milestone Completion. The following shall be the criteria used in determining whether the milestones have been met.

(I) Preliminary design review (PDR) shall be deemed met upon issuance of notification by the buyer that the PDR has been successfully completed. This notification shall, as a minimum, be based upon receipt and review of the PDR minutes, prepared and submitted by the seller, outlining the findings of the review and the action items resulting therefrom. In addition, all Contract Data Requirements List (CDRL) items required for delivery up to PDR shall have been delivered and approved by the government.

(II) Critical design review (CDR) shall be deemed met upon issuance of notification by the buyer that the CDR has been successfully completed. This notification shall, as a minimum, be based on receipt and review of the CDR minutes, prepared by the seller outlining the findings of the review with the action items resulting therefrom and certifying that the designs, drawings, and system engineering reports meet the design requirements of the contract and that no unreasonable maintainability features are inherent in the design. In addition, all CDRL items required for delivery up to CDR shall have been delivered and approved by the government.

(III) System acceptance test shall be deemed met after notification by the buyer that, as a result of final test and acceptance witnessed by the buyer/government, the system and all deliverable data items meet the approved acceptance criteria.

PREDETERMINATION OF RIGHTS IN TECHNICAL DATA AND COMPUTER SOFTWARE CLAUSE

Establishes at the time of the proposal any data which the contractor feels are proprietary data.

(I) The bidder is requested to identify in his or her proposal which data or computer software (including data or computer software to be furnished in whole or in part by a subcontractor) when delivered, he or she intends to identify as limited rights data or restricted rights computer software in accordance with paragraph (b) of the "Rights in Technical Data and Computer Software" clause of this solicitation. Identification of restricted rights computer software should include identification of the proposed restrictions to be placed upon such computer software items. Such restrictions shall be subject to the limitations of paragraph (II-C) of the "Rights in Technical Data and Computer Software" clause.

(II) Limited rights data and restricted rights computer software may be identified as such, pursuant to (I) above only if it pertains to items, components or processes developed at private expense. Nevertheless, it cannot be so identified if it comes within paragraph (II-A) of the "Rights in Technical Data and Computer Software" clause. At the request of the bidder, agrees to furnish clear and convincing evidence that the data which will be so identified come within the definition of limited rights data, or restricted rights computer software, as appropriate.

UNPRICED DATA ITEM CLAUSE

Ensures that the PM will have the option to request data which may fall under the unpriced data item. It is not anticipated that this would be necessary because of the data items specified, but the PM should allow him- or herself the flexibility to request additional data or data whose status is unknown to meet the objective of the program.

The procurement of unpriced data shall be determined solely by the government. Orders for unpriced data will be normally issued hereunder as priced, definitive bilateral modifications. In the alternative, the government may issue hereunder and the contractor agrees to accept unpriced orders (SF-30) as issued from time to time, by the procuring contracting officer (PCO) at the provisioning activity, citing this section as the authority. The contractor shall proceed as directed to the extent that the cost incurred in compliance with such orders shall not exceed the amount set forth in such orders as the maximum obligation of the government pending establishment of prices for such data. In the event an unpriced order is issued, the contractor shall, not later than 30 days of issuance or completion of 40 percent of the work (whichever is earlier) called for therein, furnish to the PCO through the administrative contracting officer his or her proposal for definition thereof including cost and pricing data and where appropriate (see ASPR 3-807.3), DD Form 633 "DOD Contract Pricing Proposal." Upon agreement as to price and delivery this contract shall be amended accordingly. Failure to agree shall be deemed a dispute within the meaning of the "Disputes" clause of this contract.

TRAINING AND DOCUMENTATION COORDINATION CLAUSE

Assures that there is a single source of contact for obtaining information pertinent to the prime system. This will be the means for the government and the training system developer to identify the proper source for obtaining the required information in a timely manner.

The contractor shall appoint a technical coordinator (TC) for the purpose of interfacing with the government or associate contractors on the technical data required to meet government program objectives beyond the items contracted for herein. The TC shall identify the most efficient means for obtaining the technical information required within the contractor's facility and be responsible for the transfer of that information to the requestor.

DATA ACCESSION CLAUSE

Ensures the compliance of the Contractor towards Government requests for any Contractor generated data.

(I) Upon order of the Government, the Contractor shall provide a copy of any Contractor generated data or Contractor's subcontractor data received by the Contractor of the type indicated in DI-A-3027/ M-128 (Mod.) and its addendum. However, this access is not limited to that list. The format and content of these internal data shall be as prepared by the Contractor to document his compliance with this contract. It is understood that the Government will not approve or disapprove any of the data submitted pursuant to this data item.

(II) The Contractor shall furnish the required copies of the data as directed by the Government. Response time for submittal of data requested by the Government shall be five (5) days (mailed by Contractor).